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THE VETERINARY JOURNAL

A MONTHLY REVIEW OF VETERINARY SCIENCE

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APRIL, 1935.

CONTENTS.

EDITORIAL— PAGE

The Position of the Profession in Regard to R.S.P.C.A. Clinics ... 145

Sir Walter Gilbey and the Royal Veterinary College ... 146

GENERAL ARTICLES—

Electrical Stunning of Animals.
By G. A. Clark ... 147

Tuberculosis in the Dog and Cat.
By Nathan Raw, C.M.G., M.D. ... 149

The Significance of the So-called Infectious Vaginitis in Cattle.
By J. F. D. Tutt, F.R.C.V.S. ... 151

Investigations into Poisonous Plants of Uganda
By R. W. M. Mettam, M.Sc., M.R.C.V.S. ... 153

Preliminary Studies in Fowl Spirochætosis in Egypt.
By Z. Morcos, M.V.Sc., F.R.C.V.S., D.V.H. ... 161

Notes on a Visit to the Veterinary College of Berne.
By Henry Taylor, F.R.C.V.S. ... 171

The Report of the Economic Advisory Council's Committee on Cattle Diseases and Repercussions therefrom.
By A. D. McEwen, D.Sc., M.R.C.V.S. ... 173

The Veterinary Officer in the Tropics.
By G. W. Sturgess, I.S.O., V.D., M.R.C.V.S. ... 179

An R.S.P.C.A. Liverpool Animal Clinic ... 185

ABSTRACTS OF CURRENT LITERATURE ... 190

PERSONAL ... 192

PLATES—

Berne University College—Dissecting Room; Dissecting Table for Limbs (two illustrations).
(*Article by* Henry Taylor, F.R.C.V.S.)

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APRIL, 1935.

THE POSITION OF THE PROFESSION IN REGARD TO R.S.P.C.A. CLINICS.

DURING the past few years the question of the treatment of the sick animals of the poor has come very much into the foreground in the public press, and constant appeals are made to the pockets and emotions of the generous animal lover by individuals and societies who usually do their utmost to give the impression that their only motive is that of humanity, prompted by a genuine wish to provide the means to aid the sick and helpless animal when " down and out " and unable to help itself.

The object is a worthy one, and one which commends itself to all animal lovers —and this includes in particular the members of the veterinary profession, without whose aid no scheme for helping the sick animal can possibly be complete.

The Council of the Royal Society for the Prevention of Cruelty to Animals have recognised this by formulating a scheme, after conference with the respective Councils of the Royal College of Veterinary Surgeons and the National Veterinary Medical Association, whereby veterinary treatment is obtainable for the sick animals of the poor in every district where their branches exist.

The principle upon which they act is one which will appeal to all, *viz.*, that the animal of the poor man has an equal right, when sick or injured, to proper veterinary diagnosis and treatment as has the animal of the rich ; and that it is morally wrong, when skilled veterinary service can be obtained, for the poor beast to be subjected to the ministrations (however well-intentioned they may be) of amateur diagnosticians, quacks and charlatans who have had no veterinary training and whose mistakes so often terminate in a cruel and suffocating death in a so-called " lethal " chamber. Unfortunately for the poor, unlucky animal, there is no coroner's inquest, nor do owners of pet animals thus condemned to die always think of asking to see the so-called " painless " process which the unskilled amateur carries out. Surely there cannot be any argument on the question as to who is the proper person to efficiently carry out the veterinary side of the work ; and in the scheme formulated by the Royal Society for the Prevention of Cruelty to Animals this is emphasised and firmly recognised as a *sine qua non.*

In a further page (185) of this issue, on the occasion of the opening of an extension of an R.S.P.C.A. Animal Clinic by the Lord Mayor of Liverpool,

supported by many prominent members of the profession (including the Presidents of the R.C.V.S. and the Lancashire Veterinary Association), the Secretary of the Liverpool Branch (Mr. J. J. Winchester, LL.D., Barrister-at-Law) emphasised this principle in the words: "Two rules were strictly observed: only those animals were treated whose owners could not afford to pay fees; and the treatment was carried out by qualified practitioners who served in an honorary capacity." That those who derive benefit from "free" treatment should be owners in poor circumstances and unable to pay the usual veterinary fee is only fair; and in Liverpool, as an additional safeguard, the Committee have an Almoner to make inquiries into the home circumstances to which the dogs or cats return. If this principle was adopted in each free clinic—and it ought not to be difficult to persuade one or two ladies of the local council to occupy this position—one of the sources of gross imposition of which one hears occasionally would disappear.

As regards veterinary practitioners "giving" their services in an honorary capacity, this must, of course, rest with each individual; but this need not necessarily mean that the work is done without any actual remuneration or *quid pro quo*, for the old adage must not be forgotten, that "the labourer is worthy of his hire," and it is only by the diagnosis and treatment of animal diseases that the veterinary surgeon can gain his livelihood. In some districts the veterinary surgeons have an arrangement with the Council whereby a half (or a quarter) fee is charged, and the account for this is rendered to the R.S.P.C.A. head office in due course. The central hospital system can only have a chance of doing good in thickly populated areas, and the site selected should be as central as possible; but that it can and does do good work can readily be gathered by the fact that in the small clinic alluded to here some 2,375 fresh cases were seen in 1934, and the actual attendances brought the total of inspections up to 6,500.

As the positions of the owners of all these cases were verified as being too poor to pay for treatment, and the veterinary surgeons who are attached to the clinic were satisfied that this was the case, it will readily be understood that the scheme is working satisfactorily. The main points, however, in this mutual arrangement scheme are: first, that the sick animal is receiving proper and adequate veterinary treatment; and, secondly, from the selfish point of view, the members of the profession keep the control in their own hands and out of the hands of the charlatan and quack.

SIR WALTER GILBEY AND THE ROYAL VETERINARY COLLEGE.

Sir Walter Gilbey, speaking in London on behalf of the Royal Veterinary College, said he trembled to think what would happen if we ceased to be the principal country in the world for the breeding of pedigree cattle, etc., for export. The whole world owed a debt to veterinary science for the important research which had been and was now being carried out with regard to animal diseases. Every day the veterinary surgeon became more and more necessary to the health and well-being of the community. He asked everybody to do their very utmost by "giving" as much as they could—and getting their friends to do the same—to the 250,000,000 Farthing Fund which had been organised to put the Royal Veterinary College on the sound footing which it deserved. Old graduates of the College are especially asked to help their *Alma Mater* by applying to the O.C. Veteran War Horses, The Royal Veterinary College, Camden Town, N.W., for full particulars and collecting nose-bags, literature, etc.

"An ounce of help is worth a pound of sympathy."

General Articles

ELECTRICAL STUNNING OF ANIMALS.

By G. A. CLARK,

Professor of Physiology, Sheffield University.

THE paper by Roos and Koopmans on electrical stunning in THE VETERINARY JOURNAL of June, 1934, raises many points of interest, not only to veterinary surgeons, but also to physiologists. Electrical stunning as a humane method of slaughter appears to have the support of the majority of people who have investigated the problem, and who are more influenced by scientific reasoning than by emotional influences; but there is still a minority who doubt the efficacy of the method, and these will not have their doubts allayed by the evidence of Roos and Koopmans. Nor, it is feared, will they be reassured by the somewhat uncritical effusion of Herr Anton Weinberger, in THE VETERINARY JOURNAL of August, 1934.

Perhaps it would be of interest to deal with the problem by discussing some of the various points raised by Roos and Koopmans in the order in which they deal with them.

(1) Firstly, with regard to Leduc's experiments on himself, there is no doubt that the current used did not produce an effect strictly analogous to that of a narcotic causing unconsciousness. This fact, however, cannot be used as an argument to support a view that currents of greater intensity would not produce an effect on the higher centres of the brain, causing loss of consciousness. From the position of the electrodes it is to be expected that a greater proportion of any given current would pass through the medulla and upper part of the cord than through those centres on which consciousness depends; obviously, therefore, one cannot expect in electrical stunning that the higher centres will be affected first, as in the case of narcosis due to drugs.

Roos and Koopmans' criticism of the use of alternating current is, however, justified by Leduc's work, and also by experiments carried out in Sheffield, but their observations must not therefore be interpreted as throwing doubt on the efficacy of electrical stunning in general. It would be a simple matter for manufacturers of stunning apparatus to introduce a rectifier which would produce a current of the same nature as the Leduc current. In a large number of experiments carried out on cats and rabbits by means of such an apparatus there has never been any indication that, suitably applied, the electric current caused any pain or failed to produce unconsciousness (Clark and Wall, 1934). Strong evidence for this statement is the fact, repeatedly observed, that after recovery from one application the animal showed no signs of fear, and did not in the least resent

re-application of the electrodes ; in fact it was often found that cats which were difficult to handle at first were much more docile following a period of unconsciousness produced electrically. This latter observation has also been made by Hess as a result of his investigations on sleep induced by electric currents (Hess, 1931). The conflicting observations of Roos and Koopmans and the authors they quote can only be due to the use of inadequate currents.

(2) In comparing the effects of the electric current with narcosis induced by drugs, Roos and Koopmans stress the nervous excitation produced by the former ; this nervous excitation is general, and muscular activity is quite inco-ordinate. One must presume, therefore, that if excitation of the higher nervous centres occurs this also must be inco-ordinate, that is to say, must produce a state of complete mental confusion, and any state of extreme mental confusion will naturally dull the powers of perception and, if prolonged, will lead to a state indistinguishable from unconsciousness. The production of such mental confusion is compatible with the observations that animals *properly stunned* electrically appear to have no memory of the event.

(3) Roos and Koopmans' general observations on the effect of the current in narcotised and thalamic animals have no bearing on the problem of unconsciousness.

The discussion of the significance of the corneal reflex as an indication of unconsciousness is interesting. Hobday (1932) argued that because the conjunctival reflex disappears, therefore unconsciousness is present ; but Roos and Koopmans state that this conclusion *cannot* be right. Surely this is a bold statement for open-minded scientists to make. It may be, as they say, that " a negative corneal reflex is of far less importance in judging the state of the central nervous system in animals subjected to the electric current than is the case in the animal under narcosis," but it has yet to be proved that it is of *no* importance.

In the criticism by Roos (1935) of Weinberger's defence of the electrolethaler (Weinberger, 1934) the functional innervation of the cerebral vessels is mentioned, and Roos quotes various authorities in such a way as to leave the impression that the cerebral vessels have no vaso-constrictor nerve supply. Stimulation of the cervical sympathetic in the cat, however, does produce constriction of the vessels on the surface of the brain (Forbes and Wolf, 1928), and a transient constriction has been observed in the anæsthetised animal by the application of an electric current in such a manner as would have produced unconsciousness in the unanæsthetised cat (Clark and Wall, 1934) ; it must not be concluded from this, however, that such vaso-constriction is the cause of unconsciousness in cases of electric stunning.

In conclusion, perhaps it would be well to consider to what extent divergent views on electrical stunning are due to the use of different types of current. It would be a great pity to arouse antagonism to the method or doubts of its efficacy, merely because of a series of experiments carried out by imperfect

technique, or because commercial interests are satisfied with an apparatus which does not produce optimum current conditions. Laymen are apt to be uncritical in such matters, and to utilise observations made by a certain technique as evidence for or against the principle of a method.

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TUBERCULOSIS IN THE DOG AND CAT.

By NATHAN RAW, C.M.G., M.D.

Late Member of the International Committee on Tuberculosis.

PRIOR to the discovery of the tubercle bacillus it was commonly believed that tuberculosis did not occur in the dog. Recently a fair number of cases has been recorded by veterinarians in Europe and America, but it is not by any means a common danger to man, although the dog is susceptible to both human and bovine infection. The cat is in close association with the family, especially with the children, but it seems to be susceptible to bovine bacilli only. Professor Wooldridge, of the Royal Veterinary College, kindly supplied me with two fresh specimens from a Pekinese pet dog and from a Persian cat which had been sent to him for treatment. The following is the result of a very careful and detailed examination in the laboratory: *B. tuberculosis* isolated from the dog; *material*—mesenteric gland.

Examination of a direct smear from the pus in this specimen showed two or three alcohol- and acid-fast organisms in every field. The bacilli were long and slightly curved.

A mixture of the pus and tissue, ground in a mortar and treated with antiformin, was inoculated into a guinea-pig. This animal was killed after having been kept under observation for six weeks, and on post-mortem examination showed macroscopic and microscopic evidence of tuberculosis. The superficial, inguinal and lumbar glands adjacent to the site of inoculation were enlarged and caseous, the liver was enlarged and whitish, and the spleen was very much enlarged, red and friable. One small nodule was present at the base of the right lung, but this was not examined. Microscopic examination of the glands and spleen showed the presence of alcohol- and acid-fast bacilli, which were longish and tending to curve, but not so definitely as in the original specimen. A second guinea-pig was inoculated with material from an infected gland of the first. After six weeks the second guinea-pig showed marked tubercular lesions, and the organisms, which

were short and straight, were microscopically demonstrable in the glands and spleen. Cultures made from the inguinal and lumbar glands were of the dysgonic type, growing very badly on Dorset egg, and not at all on glycerine agar. Subcultures were made on to Dorset egg, and at the end of a month these slopes became covered with a fine, rather moist, growth. The organisms in these cultures were short and approximated to the bovine type both morphologically and culturally. No growth was obtained from subcultures made on glycerine agar.

The pathogenicity of the strain for rabbit was determined, the usual criterion being that 0.01 mg. of culture inoculated intravenously into a rabbit produces general miliary tuberculosis if the strain is bovine, but has no effect, or very little, if the strain is human.

The organism grew so badly that hardly any visible growth could be scraped off a fourteen-day Dorset egg culture with a platinum loop. The whole of such an inoculum was injected intravenously into a rabbit. The animal died in fourteen days, showing no macroscopic lesions except in the lungs, which were full of small tubercles; sections of the lung showed great numbers of long, curved bacilli, with some beaded forms.

A second rabbit was inoculated intravenously with one-sixth of the growth from a small Dorset egg slope. This animal died in twenty-three days with the same post-mortem appearances as the first rabbit.

Cat. (?) T.B.

Mesenteric Gland.—No acid-fast or other organisms seen in smears. Tissue ground up with sand and inoculated into guinea-pig; animal killed and examined after six weeks. Generalised tuberculosis, spleen very much enlarged with many tubercles; glands caseous; organisms demonstrable microscopically; short and straight in appearance. Culture grown from inguinal gland.

Dog. (?) T.B.

Lung.—Many mucoid clear nodules, none caseous, a few acid-fast bacilli present.

Liver and Gland.—No acid-fast organisms seen. Lung and gland tissue ground up with sand and inoculated into guinea-pig. Post-mortem appearances as with cat strain.

The strains in both cases appear to be of the bovine type, as they are short and straight, and do not grow very well on glycerine agar. The spleen in both cases was enormous. It would appear that both the dog and the cat are susceptible to infection with tubercle bacilli, and chiefly to the bovine type of bacilli, so that the risk of infection from the dog and cat to humans is almost negligible.

XUM

THE SIGNIFICANCE OF THE SO-CALLED INFECTIOUS VAGINITIS IN CATTLE.

By J. F. D. TUTT, F.R.C.V.S.
Winchester.

THERE is probably no other condition met with in cattle which is the subject of so much controversy as the so-called infectious vaginitis, or nodular venereal disease.

The fact that so-called " lesions " on the membrane of the posterior vaginal vestibule are found not only in cattle affected with sterility, but in cattle which have never suffered from sterility and often are well advanced in pregnancy, has no doubt added to the confusion of opinion, and has strengthened the somewhat dogmatic opinion expressed that the condition is not an abnormality at all, but a normal physiological condition. A great mass of evidence not only in this country, but in Continental countries, especially France and Germany, show beyond doubt that if in itself it is not a cause of sterility, it is very frequently found in heifers and young cows which fail to conceive in spite of regular œstrus and repeated services ; and that when it disappears conception follows, providing there are no other changes or functional disorders present in the genitalia. Without a doubt, the term has been very loosely applied, and the writer has personally examined cattle alleged to have vaginitis, and found none. To regard the faint nodules or, one may say, slight elevations of a brownish or brownish-red colour, few in number, observable in many cattle, especially just before an œstral period, on the membrane of the vagina when the vulva is parted, as a pathological condition, is absurd. This condition has been seen in heifer calves as young as six months, and will be observed in many cases in the same animal at varying intervals, until with declining age, and no doubt masked by the change in colour of the mucosa, it tends to disappear altogether. The pathological condition to which the term of vaginitis should be reserved is reached when these nodules become distinctly enlarged, with surrounding inflammation and irritation (varying in degree), and accompanied with or without a discharge that may glue the hairs at the commissure together. In these cases it will be found that the lesions not only involve the floor of the vagina, but also the roof, and may extend well forward into the vagina, and in pregnant cases where the cervix is invaded abortion is liable to occur. In the case of heifers it is probable that the condition by itself is quite sufficient to delay conception ; and in cows which in all probability have had more than one attack the root cause of the sterility will in most cases be found to be a degree of cervicitis ; and in recovered cases of vaginitis it is often possible to diagnose its pre-existence in the animal by the presence of a cervicitis, in most cases accompanied by little or no exudate, but with the characteristic thickening and protrusion of the mucous lining of the canal through the external ós, the protrusion resembling the tongue of a boot. At other times the canal is not only reduced in calibre, but requires the smallest uterine catheter to secure passage

through it into the uterus, and the spiral nature of the canal appears to be exaggerated.

Williams associated abortion with vaginitis, and the opinion given was that in abortion the essential lesion is a cervical endometritis, with resulting weakening of the pregnancy seal (by no means a constant feature in pregnant cattle). In many cases where true vaginitis is met with in adult cattle the predominating lesion is a cervicitis. Further, in cattle affected with cervicitis, apart from those cases which may be ascribed to a history of placental retention at the last parturition, quite a few will be found to have been treated in the past for this disease. Quite recently advice was sought regarding a herd where over 75 per cent. of the heifers and cows were sterile. Œstrus was normal, but in spite of repeated services conception did not follow. Every one of the affected cattle were found with varying degrees of vaginitis; a small number (5 per cent.) had endometritis, and both bulls which had been used were found to have lesions on the penis, and in one case the infection had extended to the testicles with abscess formation, and there was a profuse discharge of pus from the urethra. Blood testing for *Br. abortus* (Bang) revealed ten reactors out of sixty. The disease had been introduced by two cows bought fifteen months previously.

Attention to the possibility of infection arising from Trichomonades has been recently directed by Williams, and by Dr. Ariess, in the *German Monthly Review*, 1934. Kolle and Hetsch ("Experimental Bacteriology," vol. 2, translated by John Eyre) state that trichomonas cannot be transmitted to female animals. In a private communication, Dr. Ariess states that, up to 1934, the presence of Trichomonades was partly doubted and could also only be verified with difficulty, the schools not generally recognising them. He describes the symptoms in cases of Trichomonades infection as follows:

"First of all there is the yellowish-white to dark-red, sticky, often very slimy and transparent, discharge, like egg soup with white yellowish specks. Trichomonades can be definitely seen in hanging drops. When siccatives are employed the proof of the presence of them can only occasionally be established. Trichomonades are found when one is familiar with their changing shapes (club- and bladder-shaped). The verification is in no way easy. Trichomonades abortion is differentiated from Bang abortion by the fact that even young animals of all ages can be affected. The discharge, which is carried from animal to animal through contact, through service, through tail wagging, through the milker's hands, etc., irritates after a time not so much the vagina, but particularly the entrance to the vagina, and produces follicular swellings and knots, which can be easily confused with a primary "knot" disease. Remember that in the same way the skin under the nostrils in man becomes red when sneezing, sniffing, taking snuff, etc. Treatment must be systematically carried out, or otherwise the disease will last for years, as I have not noticed any immunity. In Trichomonades infection abortion occurs in the early months of pregnancy. Bang abortion rarely affects young cattle, yet Trichomonades affect all ages. A medical practi-

tioner here tells me that in human patients in many cases of cæcal inflammations, appendicitis, etc., Trichomonades have been found, which corresponds to the extensive outbreak of such cases. Even these facts are treated sceptically by the official schools of thought."

To rectify the condition of vaginitis, strong disinfectants should not be used. Atarost sterility and vaginitis powder (Kommer & Co.), or pulv. nuclein co. (Hewlett) give the most uniform results. Where cervicitis or endometritis exist, these should receive similar treatment. The former can be dressed by retraction and the employment of a suitable instrument to distribute the powder. The latter should be treated by the injection of one pint of liquefied glycerine in which forty-five grains of either of the powders advised has been mixed. The injection is allowed to remain in the uterus.

A fuller description of the treatment of vaginitis is reserved for a future article now in course of preparation.

INVESTIGATIONS INTO POISONOUS PLANTS OF UGANDA.

By R. W. M. METTAM, M.Sc., M.R.C.V.S.

Veterinary Pathologist, Entebbe, Uganda.

Part I.

The plants examined for toxic properties and described in this paper were all tested at the Veterinary Laboratory, Entebbe, during the years 1931–1933. Without exception all the plants were collected on the laboratory estate. Most of the results of the feeding tests have already been reported in the annual reports of the Uganda Veterinary Department, but it is considered that a fuller description of the work done might well be given in a more accessible journal for the benefit of workers on poisonous plants in other parts of the world.

As regards the test animals, rabbits were at first used, but whenever possible positive results were repeated on sheep. For reasons of economy, these animals could not be used in every experiment. In the writer's experience, feeding tests on rabbits are not entirely satisfactory. It has been found on several occasions that plants proved poisonous for rabbits were unproductive of results when fed to sheep or goats. Conversely, it is conceivable that certain plants poisonous for sheep might well be innocuous for rabbits.

It is not known how frequently poisoning occurs under natural conditions in Uganda. It is generally held by stock owners that most sudden deaths are due either to this cause or to snake bite, even when there is no evidence of the animal having eaten a poisonous plant or having been bitten by a venomous serpent. It is usually very difficult to diagnose plant poisoning in the field, and especially to incriminate any particular plant, since so many of them show similar symptoms chiefly affecting the gastro-intestinal canal. The pastoral tribes

believe plant poisoning to be common, and their opinion is valuable, since they are keen observers of the habits of their stock.

Uganda lies across the equator, and is therefore in the tropics. However, owing to the remarkably varied geological nature of the country, all kinds of climates are found, varying from real tropics to the cooler temperate altitudes of the hill country of Bugishu and Kigezi, and the Ruwenzori-Elgon ranges. As might be expected, the vegetation also varies considerably in character.

The lake shore area is of particular interest, since here are found the greater number of cattle used for the European population of Entebbe, Kampala, etc. Both the veterinary laboratory and the large departmental stock farm at Koja are situated in this type of country, and the lake shore vegetation is very similar both at Koja and Entebbe, while the large dairy herds which supply Kampala graze over similar ground. Most of the Uganda coast of Lake Victoria is covered by dense tropical forest, which is derived from the great equatorial belt that once extended right across Africa from the east to west. The coast is very hilly, and the forest clothes the lower parts of the slopes down to the shore of the lake.

The upper parts of the hills and the flat summits are grasslands, on which are found numerous isolated copses of young trees, and a tangled maze of woody shrubby thickets, together with a dense herbaceous undergrowth. In the copses grow many of the plants described in this paper. Most of them remain green in the hot season, when the grass has either been heavily grazed or scorched to a dry, indigestible straw. Under these conditions cattle, often half starved, eat the vegetation along the edges of copses, and undoubtedly poisonous material is ingested. It must be kept in mind that many plants are more toxic than usual under these very climatic conditions. When the laboratory was opened in 1931, and the estate cleared of all rank vegetation, it was decided to carry out systematic feeding tests on the commonest herbs and shrubs and to eradicate these of proved toxicity. The experiment has been successful in that plant poisoning has been reduced to vanishing point. Experience with the Entebbe plants is also applicable to the Koja stock farm, and the grazing ground used by the Kampala dairy herds.

As time goes on, it is hoped to pay more attention to the great pastoral districts in other parts of the Protectorate which possess an entirely different flora from the lake shore areas. A watch is kept for any medicinal plants used by the natives for the treatment of human and animal disease, but up to the present nothing of value has been found.

Acanthaceæ.

(1) *Justicia matamense* (Luganda, *Kamukasa*).—This is a very common trailing weed which occurs particularly on hill sides. Cattle and goats have often been observed to eat the herb in large quantities, and it is maintained by the herdsmen to be non-poisonous. Under experimental conditions rabbits readily ate the plant in large amounts. A total of 4,110 grams (9.05 lb.) was fed without producing any symptoms.

(2) *Monechma subsessilis* (Luganda, *Kakubansimu akanene*).—This herb grows luxuriantly in damp or shady places. It is very plentiful near the lake shore, and is readily recognised by its yellow racemose flower. If the grazing is allowed to get rank, this is one of the first weeds that appear, especially under the shade of tall trees. It is regarded as being harmless for stock. Experimental rabbits ate 8.4 lb. (3,825 grams) over a period of sixteen days, but showed no symptoms of illness.

(3) *Thunbergia alata* (Luganda, *Kasamusamu*).—A very common trailing or climbing herb found twining about clumps of bush or dense masses of woody vegetation. More rarely it is found trailing through thick grass, especially in cool, damp places under shade. It is said to be quite harmless for stock, and this contention was fully borne out by feeding tests when 2,300 grams (5¼ lb.) were eaten by rabbits without ill results.

Compositæ.

(1) *Senecie abyssinicum* (Luganda, *Mukasa*).—This weed is widely distributed throughout the country, being particularly common in the eastern provinces and Uganda. It is especially abundant in old shamba lands or neglected cultivated plots, but it grows in ditches near swamps, along roads and dry, dusty paths, and in open grasslands. It is a small herbaceous plant with a bright yellow daisy-like flower. Attention was first drawn to the plant by the senior veterinary officer, Eastern Province, who reported that though cattle consumed the plant readily, they all suffered from acute tympanitis as a consequence.

Tests were at once initiated with fresh material collected at Entebbe. A rabbit and a sheep were used, but fatal results were only obtained in case of the former animal, 80 grams of the fresh plant fed over two days causing acute inflammation of the stomach and first portion of the small intestine. Along the rest of the intestinal mucosa there were scattered petechiæ.

In the case of the sheep, 11,580 grams (25 lb.) were consumed over a period of fifteen days. At first no symptoms were observed, but towards the end of the test the animal became drowsy, the respirations slow and shallow, while its temperature was too low to be recorded on a thermometer. Fæces and urine normal. Appetite good, but increased thirst was noted. The animal lay down continually with its head and neck turned to one side. Depression was marked, and the animal would only move with the greatest effort.

The plant was withheld while these symptoms were evident, and the animal slowly recovered. There is no doubt that if feeding had been pushed a fatal intoxication would have been the issue. It will be noted that in the sheep tympanitis was not observed. It appears from the above experiment that this plant is not very toxic for sheep, since large quantities have to be eaten to produce symptoms of poisoning. Nevertheless, the plant ought to be regarded as possibly harmful for the domestic animals, and whenever possible it should be eradicated from the grazing. It is proposed to produce a fatal case of poisoning in a sheep,

so as to observe more fully the pathological anatomy caused by this particular species of senecia.

(2) *Microglossa volubilis* (Luganda, ***Kafugankande***).—This is a common woody shrub found near thickets and in land allowed to get out of cultivation. It is particularly common on hill sides bordering lake shore forests. The powdered dried stems are regarded by the Baganda as a useful purgative, but large doses are said to cause gastroenteritis. Only fresh green leaves were used in the present experiment, in which a rabbit ate 995 grams out of 2,210 grams offered over a period of eleven days. No ill-effects were noted, but the rabbit appeared to dislike the leaves, and only fed with reluctance.

(3) *Wedelia oblongata* (Luganda, ***Makayi omutono***).—A very widely distributed, low, woody plant, readily recognised by its bright orange-yellow flowers. The leaves are sometimes eaten by goats, but cattle appear to avoid the plant. A total amount of 5,610 grams were offered to a rabbit, of which 4,130 grams were eaten over a period of twelve days, but no ill-effects were noticed.

(4) *Ageratum conyzoides* (Luganda, *Namirembe*).—A very common weed found all over the country. Although not very prevalent in the paddocks at Entebbe, it occurs in profusion on neglected old village sites, in ditches, along roads, etc. The Baganda maintain that the plant is harmless when eaten by stock. Experiments conducted at the laboratory showed that the fresh green leaves were extremely toxic for two rabbits in amounts of 415 and 330 grammes respectively. In both cases there was marked distension of the bladder, hydroperitoneum and stasis of the mesenteric veins.

Cattle were then experimented with as follows: (*a*) Calf 149 received intravenously 100 c.c. 10 per cent. alcoholic extract of green leaves. Beyond increased defecation and slight abdominal pain lasting about three hours no serious symptoms were recorded. (*b*) Bullock 497 was fed 3,700 grams (8.14 lb.) over a period of seventeen days. The plant was carefully mixed with chopped grass, as the leaves by themselves were persistently refused by the animal.

No obvious symptoms were noted except progressive and rather rapid loss of condition and a dryish condition of the fæces. During the last ten days of the experiment the animal ran a subnormal temperature, and from time to time ground its teeth. A peculiar heavy aromatic odour emanated from the skin, and the urine was similarly scented. During the last few days of the experiment the animal absolutely refused to eat the mixture of grass and plants, and when the experiment was stopped it was in the last stages of starvation. Death occurred a week later. At autopsy no obvious symptoms were apparent, except that the carcase was in an advanced state of inanition.

The plant cannot be regarded as poisonous for cattle. Under natural conditions the leaves appear to be extremely unpalatable, and it is improbable that cattle would ever eat them. The toxicity of the leaves for rabbit is worthy of record.

(5) *Erlangea tomentosa* (Luganda, *Twatwa*).—This is a woody shrub found in profusion on neglected grasslands near the lake shore, especially near villages

or small copses. It has large, soft leaves which have an offensive odour. Young leaves proved toxic for a rabbit. They were not readily eaten, but 1,160 grams caused death in seven days. At post-mortem there was very marked ascites, while the stomach was impacted with dry ingesta. Liver, kidneys and lungs were much congested.

(6) *Gynura vitellina* (Luganda, *Kitonto*).—A common herb abundant in most places, especially where there is some shade. It is very often associated with *Justicia matamense* and *Monechma subsessilis*, two plants also described in this paper. This plant is readily recognised by its orange-coloured tubular flowers. A single test showed it to be non-toxic for a rabbit, 1,030 grams being eaten over a period of seven days.

Leguminosæ.

(1) *Cassia mimusoides* (Luganda, *Muwoja*).—This plant is not common at the laboratory. It is a herb or small woody shrub with compound leaves and numerous small leaflets. Flowers are yellow in colour. A rabbit fed on 530 grams remained healthy. The plant is said to be good fodder.

(2) *Eriosema glomeratum* (Luganda, *Kainamuti akokutale*).—A woody shrub up to four feet, found scattered over the Entebbe grasslands. It never showed signs of having been grazed by cattle. A single test showed that 785 grams fed to a rabbit were toxic. At post-mortem there was a hæmorrhagic enteritis affecting the samll intestine, and to a less extent the cæcum. The stomach appeared normal.

(3) *Tephrosia ariosemoides* (Luganda, *Muluku omutono*).—A trailing wood plant, not uncommonly found in thick grass, especially in moist places. It has characteristic compound leaves and hastate silky leaflets. (*a*) A total amount of 3,460 grams of leaves was fed to a rabbit without ill effects. (*b*) A second rabbit succumbed after eating 98 grams of flowers and young legumes. At post-mortem there was acute hæmorrhagic gastritis and congestion of the liver.

Further tests are being carried out to see whether there is any variation in the toxicity of the plant both as regards season of year and part of plant fed. The first experiment was carried out during hot dry weather, and the second during the long rainy season.

(4) *Vigna gracilior* (Luganda, *Kaboaboa*)—This small herb is known locally as "vetch." It grows in abundance on good grasslands, and is said by the natives to be much relished by all stock. Under experimental conditions the plant proved to be harmless for a rabbit which consumed 4,635 grams in twelve days.

(5) *Crotolaria mesopontica* (Luganda, *Mukaliza*).—A common herbaceous weed found in grasslands and nearly always in flower. It appears to be severely avoided by stock, though native herdsmen do not regard it as poisonous. Owing to the ill repute of plants of this genus for domestic stock in other parts of Africa it was decided to carry out feeding tests with the local species.

As regards rabbits, the plant proved poisonous, but only after the ingestion of large quantities (1,755 grams) over a period of ten days. At a later date, when opportunity affords, this plant will be fed to a ruminant. It is of more than mere academic interest to test this species of Crotolaria in view of a possible rôle in the pathogenesis of the little understood but prevalent chronic pneumonia of sheep and goats.

(6) *Indigofera suaveolens* (Luganda, *Keyeyo*).—The species used for this test is at the laboratory in the grasslands, particularly in the more sandy soils near the lake shore. The plant is a woody shrub up to four feet high, well known to the Baganda for its staining properties. The plant furnishes a stout binding material from its bark, while bunches of its branches tied firmly together form very useful brooms for sweeping out stables and huts. The plant has no reputation of being poisonous, but cattle, even when hungry, show no inclination to eat it. A total amount of 2,895 grams (6.4 lb.) was fed over a period of seventeen days to a rabbit without ill effects, in fact the animal was in very good condition when the experiment was concluded.

(7) *Cassia siamea* (no known native name).—This is an exotic used as a shade to protect coffee shrubs from the hot midday sun. After flowering it produces a rich crop of large pods, which on falling litter the ground under the trees. These pods are readily eaten by pigs. At one time a heavy mortality of these animals on an estate near Kampala was thought to be due to ingestion of the pods, but experiments conducted at the laboratory showed them to be quite harmless for pigs, while rabbits were unaffected after inoculation with alcoholic and aqueous extracts of the pods and seeds.

Labiatæ.

(1) *Hoslundia opposita* (Luganda, *Kamunye*).—A woody shrub with strong, aromatic, minty leaves, which grows well near the edges of forest or on the fringes of copses on hill sides. As it was said by the local natives to be toxic, feeding tests were undertaken with fresh leaves and flowers, and a sheep (No. 128) was the experimental animal used. Altogether a total amount of 2,030 grams were eaten over a period of eleven days. On the tenth day the animal suffered from a a fairly profuse, liquid, dark-green diarrhœa. The condition of the sheep was very poor.

Two days after cessation of feeding the animal was found dead. At post-mortem lesions were confined to the abomasum and intestines. The mucosæ were swollen, infiltrated, and showed numerous petechiæ, as if it had been sprinkled with blood. No ulceration observed. As regards the intestine, the petechiæ were most numerous in the jujunum and colon. The kidneys showed congestion of the cortex. This plant, therefore, is undoubtedly poisonous for ruminants, but it is questionable whether, on account of its pungency, it would be eaten in any quantity under natural conditions.

(2) *Leonotis africana* (Luganda, *Kifumufumu*).—This plant is an obnoxious weed which grows in profusion on waste or neglected land. It is common through-

XUM

out the country, and is readily recognised by its deep orange-red flowers arranged in whorls. The natives do not regard the plants as poisonous, and state that goats often nibble at the younger leaves. In view of the author's experience in Kenya with a related species, it was decided to see whether this plant possessed any poisonous principles. Feeding tests, however, proved negative. Rabbits were used, and though they ate only small quantities (995 grams) over a period of ten days, no outward symptoms were recorded.

Euphorbiaceæ.

(1) *Acalypha* (?) species (Luganda, *Ngerengeza*).—At least six species of this twining or prostrate plant are found in Uganda near the edges of forests or copses where they predominate in the thick undergrowth. They are said to be much relished by bush-buck, oribi, duiker and other small antelope, and large quantities of the plant were fed to some of these antelope kept for experimental purposes at the laboratory. It was decided to test the common Entebbe species on sheep to ascertain whether it might be used as fodder during times when grass is scarce. These animals readily ate the plant, and only occasionally were small amounts left over from the daily rations. Altogether 79,100 grams (174 lb.) were consumed between August 4th and September 30th, 1932. When the experiment was concluded the sheep were in prime condition and had actually put on weight. From these results it would appear that the species of Acalypha used for the test provide a very valuable food and might be used as a supplementary fodder in times of drought. A great advantage is that the plant grows in large quantities, and can always be obtained in large amounts.

Myrsinaceæ.

Mæsa lanceolata (Luganda, *Kiwondowondo*).—This woody shrub grows in abundance near the lake shore, and has the reputation amongst the Baganda of being very poisonous. In order to test this view, feeding tests were carried out, sheep being chosen for the experiments. A total amount of 1,570 grams of leaves was fed over a period of eight days, when the animal died after showing symptoms for the previous twenty-four hours. The symptoms were intermittent liquid diarrhœa, polyuria and deep narcosis. Visible mucosæ were deeply injected, while the respirations were greatly increased. On post-mortem there were numerous petechiæ on the laminæ of the abomasum, and on the mucosa of the small and large intestine. The lungs were deeply congested and petechiæ were observed on the endocardium of both ventricles. The heart was soft, flabby and somewhat dilated. This plant must be regarded as distinctly toxic for sheep, for whom 3.4 lb. sufficed to cause death. No attempt was made to determine the poisonous principle, but free hydrocyanic acid could not be detected in the fresh leaves.

Oxalidaceæ.

Oxalis corniculata (Luganda, *Kajampuni*).—This small herbaceous plant is very common in the grasslands of the lake shore region. It is found in abundance

in full flower after the rainy season amongst the new grass. No ill repute is attached to the plant. On the contrary, the natives say it affords good grazing. Feeding tests were carried out on a rabbit and a sheep.

(*a*) A total amount of 325 grams was fed to a rabbit over a period of six days, and of this quantity only 70 grams were eaten. The plant was persistently refused, and only small nibbles taken. On post-mortem petechial hæmorrhages were present in the cortex of both kidneys and on the gastric mucosa. In addition, on the latter structure about a dozen small superficial ulcers were found. The entire intestinal mucosa was hyperæmic. The liver was congested, and the central veins were very prominent.

(*b*) Sheep No. 126 was fed 6,600 grams (14½ lb.) over a period of twelve days. Slight diarrhœa appeared after 1,990 grams had been eaten. The sheep relished the plants, and ate all that was offered. The diarrhœa reappeared intermittently throughout the test. It was very liquid, profuse and dark-green in colour. During this time the animal rapidly lost condition, and before death it was very weak, but no diarrhœa was noted during the last forty-eight hours of life. At post-mortem very extensive lesions were found. Numerous hæmorrhages were present in the cortex of both kidneys, while the medulla was deeply congested. There was a large amount of clear watery fluid in all the serous cavities. Both lungs were congested and œdematous. There was only a very mild hyperæmia of the abomasum.

The poisonous nature of this plant for sheep is of great interest in view of the author's experience in Kenya. This plant was believed to cause a fatal disease in which the kidney lesions resembled the pathological condition described in other parts of the world as "pulpy kidney." Massive quantities of the dried plant sent from the farm in the North Kenya district failed to set up any illness of any kind.

Capparidaceæ.

Cleome monophylla (Luganda, *Kasaja jobyo*).—A very widely distributed weed of native shambas and neglected or uncultivated land. It grows in some profusion near the lake shore where clearings of the forest have been effected. Occasional patches of the plant are found from time to time in the cattle paddocks despite constant eradication. The plant proved to be non-toxic for two rabbits which consumed 10,185 grams (22 lb.) over a total period of thirty-five days. During this time the animals remained in excellent condition.

Tilliaceæ.

Triumfetta tomentosa (Luganda, *Kinsambwe*).—A not uncommon woody shrub which grows in swampy or sandy soil not far from the lake shore. It is also found on wild or neglected land, and more rarely in heavily grazed grass paddocks. When fed to rabbits it was found to be non-toxic, the animals readily eating 1,735 grams of the leaves in seven days. No loss of condition was observed at the conclusion of the test.

XUM

Pedaliaceæ.

Sesamum macranthum (Luganda, *Lutungotungo*).—An herbaceous plant which grows in profusion in swampy ground not far from the lake, though from time to time it is found in drier ground along roads, and more rarely in open grasslands. When fed to rabbits it was only eaten in small quantities. One animal ate 690 grams in nine days out of a total of 2,790 grams offered. No ill effects beyond loss of condition were noted when the experiment was stopped.

PRELIMINARY STUDIES IN FOWL SPIROCHÆTOSIS IN EGYPT.

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Introduction.

KNOWLES, Das Gupta and Basu (1932)[1] reported the following: (1) The complete absence of the disease from Calcutta, possibly because of the absence of the virus from the area, as the Calcutta fowls are susceptible and the Argas ticks are found. (2) Fowls are infected by (*a*) oral ingestion of infected blood, or infected *Argas persicus* or ova laid by infected *Argas persicus*; (*b*) inoculation of virulent blood, either by scarification or intramuscular or intravenous inoculation. (3) During the acute phase of the disease spirochætes are found in every tissue of the body without evidence of phagocytosis. (4) No evidence of any phase of granule or spore formation by *Spirochæta anserina* is found in either the vertebrate or invertebrate host. (5) Balfour's granules can be produced in the erythrocytes of clean, non-infected fowls by chronic poisoning with benzol-benzoate or phenyl hydrazine. The Balfour's granules are concluded to be due to the extrusion of chromatin from the nuclei of erythrocytes poisoned by the toxins of the disease, and that they do not constitute any phase in the life history of *S. anserina*. (6) Recovery from the disease is accompanied by a solid immunity; the immune serum possessing strongly protective powers. On the other hand, the leucocytes of immune birds do not appear to possess any phagocytic powers. (7) Pigeons are susceptible to infection, but in these birds the virus gradually becomes attenuated and finally becomes non-virulent. It is not likely that the disease can establish itself in those birds in nature. (8) The Indian crow, sparrow, "myrna" and partridge are all susceptible to infection. (9) With infected *Argas persicus*, transmission appears to be possible at all seasons of the year. (10) (*a*) In the *Argas persicus* no granule or spore phase appears to develop, and that the spirochætes remain as such throughout their life-cycle in the tick. (*b*) The poultry mite and the bed bug appear to play no rôle in the transmission of avian spirochætosis. (11) Measurement of 500 *S. anserina* gives a mean length of 14.31 ± 3.615 microns, with a mean number of coils of

4.92 ± 1.470, and a short flagellum at each end was demonstrated. (12) Squirrels, rabbits, guinea-pigs, mice, lizards, turtles, toads and fish are not infected: only avian hosts are susceptible.

Balfour[2] reported (*a*) in 1907: (1) The existence of spirochætosis in fowls in Khartoum imported from Genoa, also in Sudanese and Egyptian fowls. (2) The presence of certain unpigmented intracorpuscular bodies inside the erythrocytes as associated with fowl spirochætosis.

(*b*) In 1908: (1) Balfour regarded the intracorpuscular bodies as stages in the after-phase of fowl spirochætosis, from which stage they may grow up again into spirochætes. (2) The hen runs in Sudan are found to be swarming with *Argas persicus*. (3) Sudanese fowls suffer less than imported ones, and the former pass into a chronic after-phase of the disease. (4) Dimensions of spirochætes, 9–19.5 microns, with four or nine spirals. (5) The intracorpuscular bodies vary in number from one to seven per corpuscle, and from 1 micron to 4 microns in diameter, and suggest a phase of sporulation. (6) Pigeons have never been found infected in nature. (7) Three species of *Argas* can transmit the disease. (8) The intracorpuscular bodies are present only within the erythrocytes. (9) There is no development of the intracorpuscular bodies in ticks fed on birds whose blood showed those granules, and attempts to transmit the bodies from fed ticks to healthy birds by biting, failed.

(*c*) In 1909: (1) Lice of genus *Menopon* can probably transmit fowl spirochætosis, but only mechanically. (2) The intracorpuscular bodies are frequently actively motile within the erythrocyte, and often show a trace of filament within them, suggesting an encysted spirochæte. (3) The intracorpuscular bodies may be seen before the spirochætes appear in the blood. (4) Chickens inoculated with emulsions of crushed tick's larvæ showing these granules, but no spirochætes, developed acute spirochætosis. (5) Pigeons are apparently not inoculable with this form of avian spirochætosis.

(*d*) In 1911: (1) The term " after-phase " is abandoned, due to the presence of the intracorpuscular bodies before or after the appearance of spirochætes. (2) With intracorpuscular bodies still present, spirochætes may recur in the blood, and the presence of these bodies does not mean that the bird is immune to spirochætes. (3) Very young chickens sometimes show intracorpuscular bodies which suggests the possibility of hereditary infection. (4) The disease increases in passage from bird to bird. (5) The spirochætes break down into granules in the plasma; the granules then enter the red cells and grow up in that situation into spirochætes. (6) Pigeons are insusceptible, and intracorpuscular bodies are never found in the bird, while geese are susceptible, and intracorpuscular bodies are found in them. (7) Inoculation gave negative results with a water wagtail and a house sparrow. (8) Emulsions of liver juice treated with salvarsan as studied under the dark ground, reveal granule shedding of the spirochætes.

XUM

(*e*) In 1913: Intracorpuscular bodies may appear in the absence of all symptoms—a carrier condition.

In 1914: The intracorpuscular bodies, if they are not a developmental stage of spirochæte, they must be an associate parasite carried by Argas ticks.

Marchoux and Convy[3] (1913).—(1) When an *Argas persicus* is fed on a fowl suffering from spirochætosis the spirochætes rapidly traverse the epithelium of the gut wall, and are to be found in the cœlomic cavity fluid within twenty minutes; the remainder of the spirochætes form tangle formation in the gut and break down into short spirillar forms and granules, and usually are absent by the twelfth day. (2) This fragmentation and granule formation is a process of disintegration and death, and not a phase in the true life-history of the spirochætes. (3) All attempts to produce spirochætes from granules are unsuccessful. (4) Never succeeded in freeing infected *Argas persicus* from spirochætes. (5) Filtrates of emulsions of infected ticks failed to produce immunity, and at times on inoculation into healthy birds of emulsion of unfiltered organs of infected ticks immunity was produced. (6) Organs of infected ticks, heated to 55° C., do not confer immunity on inoculation. (7) Eggs of infected *Argas persicus* contain spirochætes; a single egg may contain as many as thirty spirochætes.

Montgomery,[4] 1908, noted that: (1) Fowl spirochætosis is prevalent in Northern India. (2) The transmitting agent is probably *Argas persicus*. (3) Virulence increased on passage from fowl to fowl. (4) The spirochætes are from 7 to 9 microns in length with six to ten coils.

In 1909, stated: (1) *S. gallinarum* was readily transmitted by *Ornithodorus moubata*. (2) Also produced infection in fowls by the bite of infected *Argas persicus*. (3) By cross immunity tests, the Brazil and Senegal spirochætes differ from *S. gallinarum*.

Curasson and Andregeskey[6] have confirmed Balfour's bodies and their co-existence with spirillosis; under arsenical treatment the spirochætes disappear, but the bodies represent an entirely different infection.

Anderson[7] found that *S. gallinarum* lost its virulence on passage in fowls, but the virulence could be revived by passage through *Argus persicus*.

Mason[8] recorded spirochætosis among fowls, geese and ducks in Egypt.

Galloway[9] made up the following media for the cultivation of *S. gallinarum*: White of egg is coagulated on a water bath in tubes sloped so as to obtain the greatest surface area possible. Five c.c. of rabbit or horse serum heated for one hour at 58° C., diluted to 1 in 5 for rabbit serum and 1 in 10 for horse serum, are added. The tube is then covered with sterile vaseline and incubated for one day to test sterility. Before inoculating with spirochætes, add a drop of fresh blood from a rabbit, monkey or man. Too much blood should not be added or the spirochætes will degenerate. For subculture, sow with 0.1 c.c. of the previous culture. Growth is maximal at the fourth to the fifth day; after that the spirochætes degenerate; subculture should be taken on the fourth day.

Catnei[10] concludes the following: (1) Solid immunity is conferred lasting up to twenty to twenty-one months. (2) The duration of immunity bears no relationship to the intensity of the previous infection. (3) Re-inoculation some months later does not increase or prolong this immunity. (4) The immunity conferred by the Brazil virus or by the Algerian virus confers immunity against a second Algerian strain.

Franchini[12] had seen bodies exactly resembling Balfour's bodies, only inside the erythrocytes, not a piroplasma or anaplasma. Young forms are from 0.3 to 0.5 micron in diameter, adult forms 1.5 to 2.0 microns. No spirochætes were present.

Hoffman[12] notes that the blood of birds which have recovered from spirochætosis is protective against infection for three to four weeks. Also that there is hereditary transmission of immunity in fowls.

Ardin-Delteil and Derrieu[13] state that during a severe epidemic of human relapsing fever in Algiers they found in the blood both spirochætes and bodies similar to Balfour's bodies, which were believed to be developmental stages of spirochætes.

Ungermann[14] formulated the following for the cultivation of spirochætes: Fresh sterile rabbit's serum, either undiluted or diluted with sterile saline, is placed in suitable culture tubes and heated for thirty minutes at 58° to 60° C.; it is immediately covered with a layer of sterile paraffin, and when sufficiently cool is incubated.

Velu[15] found that spirochætosis in indigenous fowls may pass into a chronic condition with profound anæmia and look like living skeletons.

Mayer[16] recorded the transmission of spirochætes by bird mites (chicken or canary mites).

Aoki[17] found that: (1) The precipitation test was unreliable in diagnosis. (2) A complement fixation test gave positive results both with spirochæte extract and with the tissues of highly immunised birds. (3) Fowls can be immunised against spirochætosis by the injection of infected serum from which the spirochætes have been removed by heating, washing with chloroform and drying at 55° C. for twenty-four hours. The addition of iodine to the serum destroys its immunising properties.

Salalah Eldin,[18] referring to intracorpuscular bodies in comparison with *Ægyptianella pullorum* (Carpano, 1920, or *Avian babesia*, Morcos, 1931) and nuclear detachs, explained fully the morphological difference existing between detachs and intracorpuscular bodies.

Leese[19] mentions the value of Soamin, ½ grain, in the treatment of fowl spirochætosis.

Nogouchi[20] used the following media for the cultivation of *S. gallinarum.* Suitable ascitic fluid (the suitability of a sample can only be decided by trial) is used, and the tissue may be either fresh rabbit kidney or the pectoral muscle

of chickens. Growth comes to a standstill on the fifth day, after which the cultures were full of refractile rounded or ovoid granules. Subcultures after thirteen transplantations were still virulent. Cultures four weeks old confer immunity.

Hata[21] modified Nogouchi's method for the cultivation of *S. recurrentis* by using semi-coagulated masses of normal horse serum, to which twice its volume of sterile normal saline solution has been added.

Haver[22] found that on defibrinating virulent blood and storing it in the ice chest, virulence is maintained.

Lavory and Levy-Bruhl.[23]—(1) For normal fowls the following figures were given: Red cell count, 2,600,000 per c.mm.; iron content of the blood, 0.045 gram per 100 c.c.; Red cell globular resistance, 0.04; leucocyte count, 30,000 to 45,000 per c.mm. Normal leucocyte formula: mononuclears, 62 per cent.; polymorphonuclears, 38 per cent. (2) On infection with *S. gallinarum* (*a*) the number of red cells being reduced to one-half in five days, resembling the pernicious anæmia, but is distinguished by the rapid and complete recovery in twelve days after the crisis. (3) This anæmia and its recovery accompany leucocyte variations.

Day of disease	Clinical evolution.	Red blood cells.	Leucocytes.
1 to 2	Incubation	Onset of anæmia	Leucocytosis of polynuclears
3 to 5	Developed disease	Progressive fall in count	Leucocytosis of neopolynuclears
5 to 6	Crisis	Maximal anæmia 50%	Leucopenia
6 to 10	Convalescence	Recovery	Mononuclear leucocytosis
—	Healthy	Normal	Normal or slightly prolonged mononucleosis.

Dschunkowsky[24] reported that atoxyl in doses of 0.4 to 0.5 g. inoculated with infective blood prevented infection. Salvarsan was much more active. If one inoculates 0.075 g. on one side, and 0.3 c.c. v.b. on the other, protection is acquired.

Dschunkowsky and Luhs (1909) found that the serum of geese which had recovered from the disease has curative and preventive properties when inoculated into fowls in 5 g. and 0.01 g. successfully.

Galli-Valerio[25] reported that *S. gallinarum* and *S. anserina* were identical, and that *Argas persicus* infected with spirochætes were found to be infective after six months, but not at nine or ten months. The ticks were kept at 30° to 32° C.

Levaditi[26] found that: (1) Fowls, geese, chicks, pigeons, the domino, the capucins, the lark and the calfat are all susceptible, but the guinea-fowl is refractory. (2) During the disease there is always leucocytosis, and the erythrocytes become basophilic. (3) The spirochætes remain motile in the blood stream until the last moment of their appearance in it, and show no granular degeneration. (4) In the cytoplasm of the large macrophages of the spleen and bone marrow

the spirochætes are often seen twisted into knots, but never show granular degeneration. (5) Intravenous injection of 2–4 c.c. of immune serum into an infected bird stimulates phagocytosis of both red cells and spirochætes, capillary embolism follows, and death; a certain number of fowls thus injected, however, recover.

In 1906, Levaditi (1) cultivated the Brazil spirochæte on glucose agar and fowl serum heated to 77° C. in collodion sacs placed in the peritoneal cavity of rabbits, and after nine passages the spirochætes were still virulent. As the cultures die out they show granules within them which take on a red colour with Giemsa's stain. (2) The spirochætes would only develop in fertilised eggs, lasting six, seven or eight days, and kill the embryo. (3) The Brazil virus is not transmitted from the hen to the egg; embryo acquires passive immunity.

Marchoux and Salimbeni[27] reported that immune blood or virulent serum kept two to four days, or heated for five to ten minutes at 55° C., can be used to vaccinate healthy birds against the disease. The serum of a sick bird, filtered through a Berkefeld filter, can be also used as a vaccine.

Verge[28] reported the successful immunisation with infected blood after keeping for sixty days, or heating it at 55° C. for five to ten minutes; protection and cure on use of serum of horses immunised by intravenous injections.

Experimental—Section A.

At a breeding farm in Mattaria, near Cairo, where hundreds of Leghorns have been reared during the last five years, an outbreak of fowl pox took place, and on inspection about 20 per cent. of the young birds, three to nine months old, and about 7 per cent. of the adult birds, one to three years old, were found very anæmic, mucous membranes very pale, very light in weight and wasted in breast and leg muscles. The birds were seen at times to be sleepy, but no paralysis was noticed. Fowls with pox lesions were treated, and those free from lesions were intradermally inoculated with formol-treated pigeon-pox virus. Five anæmic birds were selected and isolated for experimental purposes.

Case 1.—A nine months old Leghorn hen. Comb, wattle, oral and conjunctival M.M. yellowish in colour, breast and leg muscles highly wasted, and the bird, on touching, sounded like a skeleton studded with feathers.

(*a*) *Blood Examination.*—Fresh preparations revealed few dot-like irregular intracellular bodies. Usually one was seen inside the red cell between the wall and the nucleus, but one, two, or even three were at times seen inside the white cell, both lymphocytes and polymorphonucleated cells. On close examination with the dark ground illumination, the bodies seemed to move sluggishly in the cytoplasm of the cell; no foreign bodies or spirochætes were seen in the plasma.

(*b*) *Stained Blood Films.*—Various films were taken daily for five days, and some were stained by Leishman, some with Giemsa, and some with both. Films were taken by puncture of a wing vein, promptly dried and fixed with absolute alcohol for fifteen minutes. The stains were left on the films for various periods

XUM

for comparison of films, and the following picture was revealed in every case: No free spirochætes were seen, but dot forms, irregularly round or oval bodies, were seen inside the red cell between the nucleus and the wall. Some leucocytes were found containing these bodies; one or more could be seen inside the cytoplasm of the white cell. These bodies always took the pink stain regardless of the period of exposure. No definite membrane could be seen, and no nucleus was revealed in these bodies, the largest of which was about one-fifth the size of the nucleus of the erythrocyte, and the smallest was about one-tenth the size of the nucleus of the red cell, homogeneously stained and pink in colour. These bodies in question do not at all resemble Balfour's bodies. Balfour's bodies, as described and illustrated in Balfour's drawings, have been seen in Rhode Island fowls (as will be described later), and are typical Babesia, but the bodies in question, on using higher eye-piece magnifications, were seen to be quite irregular, just like a miniature floor-brush with serrated or projecting portions, while at other times they looked like coiled thread—like a little ball of wool. The same hen was put inside a wire cage, fixed on pots containing paraffin to avoid the approach of ticks. It was given just enough space in which to move about, with water and chopped grass—" barseem "—once a day. Blood examination for the first four days of imprisonment revealed the same bodies, but they seemed to be more numerous: two or three red cells could be seen in the one field, each harbouring one body. On the fifth day the hen looked weaker, and was seen sleepy and unwilling to move. Blood examination revealed free spirochætosis and diminution in the number of the pink intracellular staining bodies. On the seventh day a heavy infection of spirochætes was revealed; the spirochætes were of four to six double curves, 1¼ to 1½ the length of the red cell. The hen was then inoculated intramuscularly with 1½ c.c. of 1 per cent. piroblue. On the eighth day the spirochætes were not as numerous, and a second dose of 1½ c.c. of 1 per cent. piroblue was administered. On the tenth day neither free spirochætes nor intracellular pink bodies were seen, and the hen was released and looked a little brighter and less sleepy. A month later blood examination was negative, and the hen looked normal, but was still light in weight, although unfeathered areas lost the yellowish tint and looked more or less normal. At this stage the owner of the farm was informed, and taking the advice given him, he had all his birds inoculated with two successive doses of atoxyl. Two months later the birds were again inspected, and looked fairly healthy and had gained in weight.

Case 2.—Nine months old Leghorn cock, with some clinical features similar to Case 1. Blood examination revealed the same bodies as in Case 1, and no free spirochætes were seen. Half c.c. of blood was drawn in 4 c.c. sterile normal saline, and three ten-day old Leghorn chicks were each subcutaneously inoculated with 0.1 c.c. of the blood saline. (The chicks were hatched on the spot; eggs being brought from England and sent by air-mail post, as eggs sent by boat did not hatch.) Eggs were imported to avoid any possibility of hereditary

resistance; the same precautions to avoid approach of ticks to incubator and chicks when hatched, and during the experiment, were taken.

Result.—Blood examination of chicks before inoculation was negative. Chick No. 1 revealed free spirochætes forty-eight hours after inoculation, and the blood films from chicks 2 and 3 revealed free spirochætes thirty-six hours after inoculation.

The cock was examined daily, and blood examinations revealed the pink staining bodies. It was then caged and starved (a little chopped grass and water only being allowed), and by the ninth day of such treatment free spirochætes were seen in the blood. Three repeated doses of 1½ c.c. of 1 per cent. piroblue were administered, and forty days following treatment the cock resumed healthy normal life.

Cases 3, 4 and 5 (nine months old Leghorn hens) revealed similar intracorpuscular bodies, and were treated with two successive doses of atoxyl, after which blood examinations were negative. Cases 3 and 4 improved, and were mixed with Cases 1 and 2, but Case No. 5, although the blood was negative after atoxyl treatment, did not improve, and was destroyed.

Section B.

(1) A Rhode Island hen, about eighteen months old, was admitted to the school laboratory. The hen was lying down, unable to get up, and on attempting to move, it fell forward and then managed to sit on its hocks. Comb and M.M. deep-yellow in colour. Great loss of weight was evident.

Blood Examination.—Fresh examination revealed a heavy infection of intraerythrocyte bodies inside the cytoplasm between the nucleus of the red cell and the wall, almost always round in shape, with homogeneous vacuolated centre and a definite membrane. These bodies were only seen inside the red cells.

Stained Blood Films.—Whether Leishman, Giemsa, Wright's, a combination of any two stains or one following the other was used, the bodies were seen inside the cytoplasm of the red cell with definite blue staining membrane and a definite pink nucleus inside the membrane in a dot form, a line form or granular form. The circular forms predominated, pear-shaped forms were not uncommon in various sizes, from dot forms almost the size of an ordinary coccus to a full-grown parasite. These bodies were morphologically indistinguishable from Balfour's bodies, as illustrated in Balfour's diagrams. After film preparation, 0.03 gram atoxyl was injected subcutaneously; twenty-four hours after admission the hen was found dead, and on post-mortem examination yellowish coloration of serous and M.M. membranes, swollen liver and highly enlarged, friable spleen was met with. Spleen smears revealed a high infection of these bodies, *Avian babesia*, which could be seen intraerythrocyte and in the plasms along with the broken red cells. On preparation of blood films before death, the blood looked watery and less pinkish, while in spirochætosis the blood more or less retains red coloration.

XUM

(2) An Egyptian-bred duck, black and white, usually known as Sudanese duck was reported by the owner, who stated that every time it sits, ducklings hatch, but a few days after hatching most of them waste and die. The duck looked perfectly normal. Stained blood films revealed a fairly heavy infection of *Avian babesia* (Balfour's bodies). One c.c. of blood was drawn from the duck's wing vein into 5 c.c. sterile normal saline solution, and three one-month old cross-bred chicks (Leghorn hens and Egyptian cock) were each inoculated subcutaneously with 0.2 c.c. blood saline. Blood examination of chicks before inoculation and forty-eight hours after inoculation was negative, but on the third day *Avian babesia* was seen, and no free spirochætes were seen. Piroblue, ½ c.c. of 1½ per cent. solution, was administered intramuscularly for three successive days, after which the blood was negative. Thirty days following the birds looked normal, and the blue coloration of the skin following piroblue disappeared.

Section C.

(1) Ten cross-bred chickens (Rhode Island hens and an Egyptian cock), three weeks old, whose blood was negative and condition good, were admitted into a pen heavily infected with Argas ticks, where previous cases of spirochæte and *Babesia* had been kept. The Rhode Island hens and cock were inoculated with atoxyl and piroblue alternately before mating, and proved immune to spirochætes and piroplasma.

Ten days after admission, blood examination of all the birds revealed a heavy infection piroplasma (*Babesian pullorum* or *Avian babesia*). 0.75 c.c. of 1 per cent. piroblue was intramuscularly inoculated on two successive days, and on the third day blood examination revealed no *babesia*, but six out of ten chicks revealed free spirochætes. 0.001 gram of atoxyl in 1 c.c. saline was intramuscularly given on two successive days, and the blood was negative on microscopic examination.

(2) One c.c. of blood containing spirochætes was drawn from the wing veins of two infected Leghorn chicks into 7 c.c. sterile normal saline, and the following birds were inoculated subcutaneously: four Egyptian-bred pigeons, 2 weeks old, each 0.1 c.c.; four Egyptian-bred pigeons, six months old, each 0.2 c.c.; five Egyptian-bred fowls, two months old, each 0.2 c.c.; five Egyptian-bred laying hens, about one year old, each 0.3 c.c.; two one-week old Leghorn chicks, each 0.1 c.c. (control).

Result.—The control chicks were found swarming with spirochætes on blood examination forty-eight days following inoculation, while the Egyptian-bred pigeons and fowls were negative for spirochætes on daily examination of blood for four weeks after which the birds were released.

Section D.

Immunisation.—Vaccine preparation. A white Leghorn, four months old, died with a heavy infection of spirochætosis. Both the liver and spleen were taken and weighed; two grams of organs were emulsified into paste, 40 c.c. pure glycerine, 40 c.c. saline, and 0.1 c.c. commercial formalin added; the

mixture was shaken at intervals for ten days before use, controlled microscopically and culturally for purity, and then filled into ampoules aseptically.

Experiment.—Chick 1, when three days old, was given 0.25 c.c. vaccine intramuscularly, and a second dose of 0.5 c.c. vaccine when nine days old. When twenty days old the chick was given 0.1 c.c. of 1/20 blood saline heavily infected with spirochætes. Chicks 2 and 3 treated just as chick 5. Chick 4, when twenty days old (control) was given 0.1 c.c. 1/20 blood saline infected with spirochætes.

Result of Experiment.—Chick 4 died on the fifth day of inoculation, blood films revealed a heavy infection of spirochætes forty-eight hours after inoculation until death; while chicks 1, 2 and 3 were examined for ten days, and neither spirochætes were seen nor loss of condition noticed. Thus a vaccine prepared from internal organs is a promising antigen.

Summary.

(1) A chronic form of spirochætosis occurs among European-bred fowls reared in Egypt, associated with the presence of small intracellular pink staining bodies, and when the condition of the bird is lowered, free spirochætes are seen in the blood. (2) Piroplasmosis of fowls (*B. pullorum*) is totally different from any form of spirochætosis on microscopic examination (Balfour's bodies are identical to *B. pullorum*). (3) Liver and spleen emulsion taken from fowls suffering from spirochætosis and treated by formalin is a promising antigen for protection. (4) Piroblue, or atoxyl, or both, are useful drugs for the treatment of avian spirochætosis and piroplasmosis. (5) Egyptian-bred pigeons and fowls are resistant to spirochætosis through hereditary resistance, while cross-bred fowls are fairly susceptible.

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NOTES ON A VISIT TO THE VETERINARY COLLEGE OF BERNE.

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Haywards Heath.

MENTION of the fact that the next International Veterinary Congress will meet at Berne, in Switzerland, tempts me to write a few lines on a visit to that city and its college a year or so ago.

I had been spending a holiday at Wengen, renewing acquaintance with that triumvirate of mountains the Eiger, the Mönch, and the Jungfrau, with their everlasting snows, reigning with magnificent grandeur over that part of the Bernese Oberland; and, on my way to Geneva to stay with friends, I stopped at Berne for a day or so. On inquiring from the *concierge* at the hotel as to the position, etc., of the veterinary college, evidently I did not make myself understood (my knowledge of French and German is very rudimentary), and I found myself at the Veterinary Department of the Government, just as one might find oneself at the Animal Branch of the Ministry of Agriculture in Whitehall, instead of the R.V.C., Camden Town. However, there was a young lady at the former who spoke English; then I found how to proceed. She telephoned for me to Dr. Hauser, of the Tierspital in the Bollwerk, who very kindly offered to show me round. It was vacation time, so there were no students there.

The college is a mile or two out of the city, the buildings forming four sides of a square, with a covered run in the centre for clinical examination of animals, and two fenced rings for the smaller animals. In the anatomy department, around which Dr. Hauser, the professor, conducted me, I noticed a table for the dissection of the limbs of the subject which had been designed by Professor Rubeli, of Berne, and which seemed an excellent arrangement for the student doing that work. In the library of the anatomical professor there were numerous books on that subject, but one looked in vain for one in English. The tomes by Bradley, Share Jones and MacFadyean were absent. The one which seemed to be favoured was the " Atlas Anatomy of the Horse," by R. Schmalz, of Berlin, an exhaustive treatise and an excellent work.

The lecture room was dark, but otherwise good. In the histology department there was a conspicuous absence of English works. A speciality of the anatomy department seemed to be full descriptions of Teratomata (calves chiefly) with their outstanding macroscopic differences. In the pathology department the assistant, in the absence of Professor Huguener, very kindly showed me round. There were guinea-pigs running about in one of the laboratories which was used for the detection of tubercle bacilli in milk, but they were not kept under ideal conditions. The museum was dark, hot, and not well adapted for study. Shortness of money has prevented its reconstruction. A specimen of hydrometra in a six-weeks-old calf was noticed, also ostitis of the horn of the ox, the horn being three or four times larger than its fellow. There were many specimens of thyroid gland complaints, perhaps because it interests the Swiss more than us: one does perhaps see more cases of goitre there than here. There was a specimen of the secondary thyroid growth in the heart of a dog. In the book department there were no English authorities or periodicals noticed.

The hospital was under the care of Professor Leubbold. In the infirmary there were about thirty horses, many of them being army horses. The breed is known as the Jura horse. One army horse was branded on the neck in quite large characters, 85 B 30, the B representing the category and the 30 the year. All horses imported into Switzerland are branded on the left shoulder with a letter which seemed to be either E or I. One Hungarian horse was branded on the left side under the saddle, N 44, with a crown underneath, which represented it as the produce of a Government stallion. On the right side there was a 2 and an M. The letter and figures were some 3½ inches in height.

In the hospital there was also one cow of the Siementhal breed, and two or three dogs (including one Scottie) with skin troubles.

The college is not a large one, the students only numbering some forty to forty-five. The course there was four years, but it was contemplated to increase it to five. There is one other veterinary college in Switzerland at Zurich.

The buildings for cattle in the country districts are chiefly of wood, with wooden floors constructed from trunks of trees, and windows are conspicuous by their absence. Some of the byres in the Geneva district, which are perhaps average, had a door at one end and a window used for throwing out the manure at the other, and that was all there was for ventilation and light. One might imagine the incidence of tuberculosis would be high, but I have no statistics.

The Siementhal cattle rather resemble our Jerseys, but are heavier. The Jura horses are either chestnut or bay colour, and remind one of our Suffolk Punch horses, but are not so heavy.

Berne is a wonderful city, with its colonnades, its market stalls, its bear pit (where bears have been kept since about the fifteenth century), and its imposing Government buildings, from the terrace of which may be obtained a magnificent view of the snow-capped mountains of the Oberland piercing the cerulean sky.

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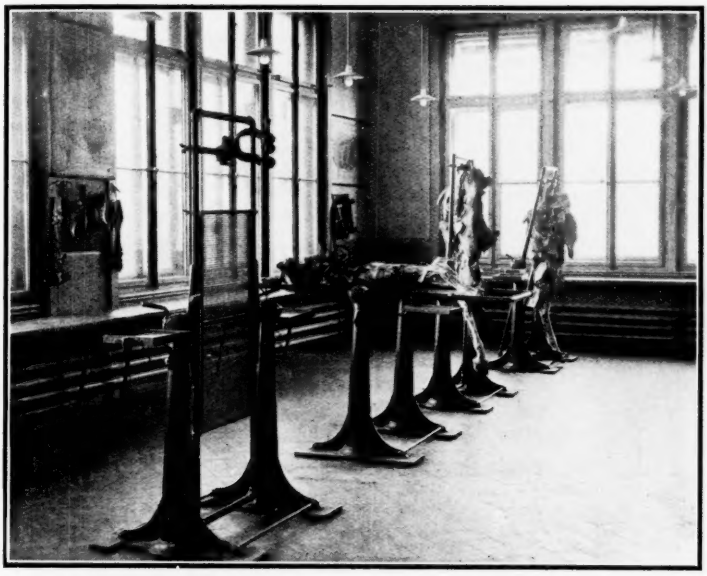
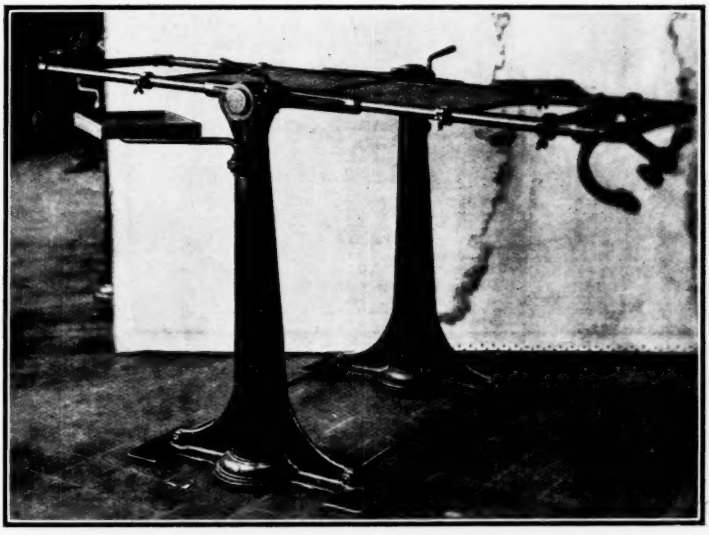


Dissecting Room, Berne University Veterinary College.



Dissecting Table for Limbs.

(*Article by* Henry Taylor, F.R.C.V.S., *page* 171)

XUM

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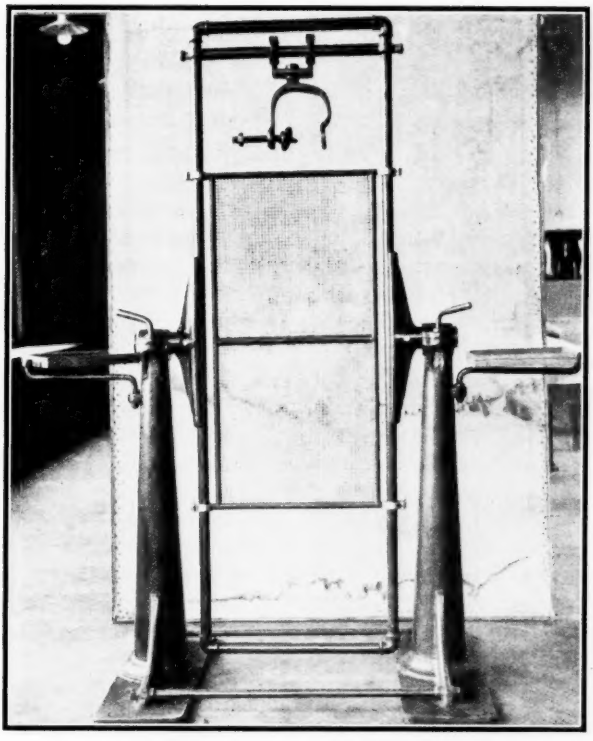

Dissecting Table for Limbs.

(*Article by* Henry Taylor, F.R.C.V.S., *page* 171)

XUM

THE REPORT OF THE ECONOMIC ADVISORY COUNCIL'S COMMITTEE ON CATTLE DISEASES AND REPERCUSSIONS THEREFROM.

By A. D. McEWEN, D.Sc., M.R.C.V.S.
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NINE months after the publication of the Committee's report and as a direct sequel to it, the Ministry of Agriculture introduced its Attested Herd Scheme. On May 1st, the Milk Marketing Board's Accredited Producers' Roll will come into operation. With these two plans launched upon the dairy industry it is unlikely that the report will serve any significant purpose.

Nevertheless, its treatment of purely veterinary questions is still of interest, particularly as it has received surprisingly little criticism despite the obvious inadequacy and vagueness of many of the suggestions and conclusions. There is no need to review information given on veterinary matters where this is essentially orthodox, but attention should be drawn to statements and expressions which illustrate the shortcomings of existing procedure or reflect the poverty of information at the Committee's command, or show a failure in the appreciation of realities.

Very appropriately early consideration is given to the wastage in dairy cows, and from figures compiled by the Hanna Institute, the National Institute, Reading, and the School of Agriculture, Cambridge, it is recorded that the annual wastage amounts to a figure equalling 21.8 per cent. of the total animals in herds examined. Taking the figure for disposals from all courses as 100, then 58 per cent. are disposed of because of disease. Further analysis shows that sterility accounts for 23.8 per cent., abortion 3 per cent., udder disease 7.7 per cent., tuberculosis, Johne's disease and wasting 9.7 per cent., death and miscellaneous disease 10.4 per cent., and the tuberculin test 3.6 per cent. Although it is admitted that the accuracy of these figures is doubtful, nevertheless they are of considerable significance.

It is interesting to observe the Committee's reaction to these figures, especially the arresting one shown for sterility. They observe " the striking feature of this table is the importance of sterility as a cause of disposal. This condition is due to a number of causes of which infectious abortion is one of the most common." Sterility is thus summarily dismissed with the responsibility conveniently transferred to contagious abortion. We all know this to be a common conception, but where is the data to prove the truth of it in this country? Furthermore, the seriousness of sterility does not appear to have been the concern of veterinarians giving evidence before the Committee, because on paragraph 18 it states: " If statistical proof is deficient there is unanimity among experienced veterinarians that four diseases are pre-eminently responsible for the farmers' losses, namely, contagious aboriton, tuberculosis, mastitis and Johne's disease. Of these it is

agreed that contagious abortion is the most, and Johne's disease the least, important." It is to be hoped that contagious abortion is responsible for the majority of cases of sterility, but with our lack of knowledge the wish is father to the thought.

The disposals due to the tuberculin test were practically confined to certain tested herds, but in these herds they constituted one-sixth of disposals for all disease, which is greater by 6 per cent. than the combined disposals for tuberculosis, Johne's disease and wasting. Although the report resolves itself eventually into a scheme for the control of tuberculosis by testing, there is nothing to show that the cause of the relatively high percentage of reacting animals in tested herds was inquired into or is considered worth investigation. Evidence was given by officials of the Ministry responsible for the licensing of herds supplying Certified and Grade " A " tuberculin-tested milk. Did they throw any light on the cause of these failures to the tuberculin test ?

Tuberculosis is the watchword of the Report, and it is obvious that the chief purpose of the Committee was to formulate proposals for the control of tuberculosis, a disease responsible for a relatively small proportion of the wastage among dairy cattle. This reflects the importance given to bovine tuberculosis from the point of view of public health, and possibly the political significance of the interests vested in pasteurised and raw milk respectively. Most interesting remarks are made upon existing legislation relating to the disease, and particularly to the effects of the Tuberculosis Order of 1925. There is little doubt that the Order is regarded as of very limited value in reducing the extent of the disease among cattle, and that clinical examinations have not made a very effective contribution to safe milk, as in this connection the Report says: " The measures discussed have not appreciably reduced the incidence of tuberculosis among dairy cattle. In practice, cows are only removable under the Order at a late stage, after infection has had ample chance of spreading, though in some counties the Order has been interpreted to allow earlier removal. But if this interpretation was made universal, the cost to the public would be enormous, and there might be a rapid contraction of the milk supply."

" It is important to form a quantitative estimate of the extent to which routine veterinary inspection reduces the degree of infection of the milk supply. The data, however, on which we are forced to rely in making such an estimate are to some extent contradictory, and in many respects deficient. It is certain, for example, that many cows yielding tuberculous milk are not discoverable by clinical examination. The results of the two investigations bearing upon this point known to us are not easily reconciled. But the proportion of such cows is not likely to be less than one in four. Again, it is highly improbable that, having regard to the intervals between inspections, veterinary inspection of the frequency we contemplate would eliminate much more than three-quarters of those cows which yield tuberculous milk and show recognisable clinical symptoms of tuberculosis."

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As an illustration of the effectiveness of routine veterinary inspection in reducing the extent of infection of milk, the Committee gives a table showing the results of tests for tubercle bacilli in samples of mixed milk from individual herds in the West Riding, by the County Borough Councils of the principal towns drawing milk from the area. The table shows that since 1929, when routine inspection became general, there has been an average reduction of nearly 2 per cent. in the percentage of infective samples, the average percentage of infective samples in the six years before 1929 being 6.8, and from 1929 to 1933, 5.0. But this reduction does not appear to have much significance from the public health standpoint, as the report says: "A reduction in the infection of milk with bovine tuberculosis is not accompanied by a proportional reduction in the infection in man," and guardedly predicts that the reduction of infection in man from bovine tuberculosis by means of routine clinical inspection is likely to be disappointing. "We have evidence which suggests that the rural parts of the West Riding, where routine veterinary inspection is energetically carried out are no more free from bovine tuberculosis than rural parts of Kent, where there is no routine inspection."

The Committee's inability to find routine clinical inspection of real value in the control of tuberculosis and in securing a safe milk supply is shown by still further references to these matters, and two more quotations may be given to illustrate this. Referring to the milk supply, they state: "Clinical inspection, especially in herds from which milk is sold directly to the producer, should reduce the extent of infection of milk consumed by the public," and in connection with the reduction of the extent of the disease in bovines the Report says: "But cows in the early stages of tuberculosis, before clinical symptoms appear, may spread infection as readily as those removed under the Tuberculosis Order, and they are much more numerous; the strict administration of the Order, though it might have some, would be unlikely to have an important effect in this respect." The Committee were apparently favourably disposed to routine clinical examination, and the list of witnesses shows that several able veterinarians, whose duty it is to administer the Order, gave evidence before the Committee; therefore it is impossible to escape the conclusion that routine clinical examination has failed to establish its case as an effectual contribution to the control of tuberculosis and the supply of safe milk.

The Committee, however, finds virtue in routine veterinary inspection by whole-time officers, as it is assumed to have a hypothetical educational effect which is calculated to create among farmers an atmosphere favourable to eradication schemes. I wonder whether Surrey farmers, who have had these benefits for several years, are any more enthusiastic over the eradication of tuberculosis than their neighbours in Kent, who have not enjoyed similar advantages?

In considering means for the control of tuberculosis, emphasis is placed on the numerical and commercial importance of the flying herds in the country, and on account of these the Bang method of control is dismissed

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as unimportant, being inapplicable in such herds because it involves restrictions of movement which would interfere with the prevailing customs of the industry.

The establishment of disease-free areas is dismissed because it would necessitate the compensation of owners for their tuberculous animals and the creation of regulations governing the movement of cattle into the areas, both of which are regarded as objectionable.

But according to the Committee, the solution of the problem involves neither restriction of movement nor compensation. "Its aim is to prevent the infection of cattle from disease-free herds in transit by their strict segregation from all cattle other than from disease-free herds, by measures such as special markets (or sections of markets) and special precautions during transport. Similar precautions would be necessary to protect animals from infection when being exhibited at agricultural shows." The Report goes on to say that "the adoption of such measures would considerably increase the number of herds in which eradication would be possible. The practical difficulties would be considerable, but they are not insuperable."

This appealingly simple plan might work beautifully when, to provide a population of animals to travel, attend agricultural shows and markets, and be purchased by flying herds, the disease-free breeding herds are established. Now to stimulate the prosecution of eradication a system of loans, levies and bonuses was proposed, the essential inducement being an increased price of 1*d*. per gallon for milk from tubercle-free herds. Tubercle-free breeding herds having a greater number of young animals would not benefit to the same degree as milk-producing flying herds unless there was a demand for tubercle-free stock from the former at a materially enhanced price. But before the demand can come into force there must be clean flying herds to create it. As there will be a scarcity of tubercle-free animals to replace those disposed of from flying herds, should they wish to eradicate, it seems doubtful whether the flying herds would be able to commence eradication, and thus create the demand which would make eradication worth while to the breeding herds. Furthermore, for the breeding herds to reap a commensurate advantage from eradication by the sale of stock, the value of the stock must reach such a level that the pecuniary advantage gained by the sale of milk from purchased animals would be largely neutralised by the increased price which had to be paid for them. Should this occur the stimulus to eradicate the disease in flying herds would be weakened or annulled, and should any setbacks occur, *e.g.*, if reactors unexpectedly appear and the bonus be temporarily lost, the eradication policy and the purchase of expensive tubercle-free animals would be abandoned, the game not being worth the candle. Again, as the direct and fullest advantage would be obtained by the sale of tubercle-free milk, the effect may well be to transform the breeding herds into milk-producing herds and not stock-selling herds, with the drying up of what was to be the source of clean animals for flying herds. In short, the difficulties of eradication, familiar to veterinarians,

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make it very improbable that flying herds will be able to participate in a scheme designed for their benefit.

It must be noted, however, that at the commencement of eradication, and until a resevoir of tubercle-free herds is available, the Committee recommended that tubercle-free herds should be permitted to recruit non-reacting animals from any herd after they had undergone a preliminary period of isolation. It is very doubtful whether the difficulties of the early stages of eradication would have been satisfactorily lessened by such a concession, and it is interesting to note that the Ministry of Agriculture's Attested Herd Scheme, the legitimate offspring of the Report, does not allow this concession.

Refreshing candour is shown in discussing the disposal of reacting animals. A is to be free to sell his reacting cattle to B, then A buys clean cattle from C. It is true that this will not increase the number of infected cattle in the country, but will it make an effective reduction in the present 40 per cent. infection? Meantime, B's tuberculous cows are having calves, but there is no suggestion that any consideration should be given to efforts to reduce infection among such calves and young cattle. B may be 100 per cent. infected, and buy A's infected animals "as long as good care is taken to prevent the sale of tuberculous milk." It would have been interesting had the Committee shown how this pious expression could have been effectively put into execution in view of the inability of clinical inspection to do so, and the fact that compulsory pasteurisation was only contemplated after eradication had made established progress.

One of the chief purposes, if not the chief purpose, the Committee set themselves was to decide upon means whereby the milk at the farm could be freed from tuberculosis infection. After careful consideration, routine veterinary inspection was found inadequate as a means of securing a safe milk supply. Nevertheless, a great extension in the number of whole-time veterinary officers, together with compulsory routine clinical inspection, is recommended for all. The eradication scheme was to be the only means of securing safe milk, and it is surprising to find that no proposals are made regarding any other means which might be tried with the prospect of lessening the infection of milk at the farm, the more particularly as the heavily-infected herds of the type possessed by B are bound to be numerous. Surely on such herds some thought to the possibility of controlling the disease was called for. Would immunisation gradually reduce the extent of infection in such herds, and in time contribute to the safety of the milk? But the Committee saw no practical contribution to the reduction of tuberculosis by immunisation. In commenting on B.C.G. vaccine, the Report says: "We are aware that a high degree of resistance, amounting in some instances to complete immunity, to an experimental tuberculous infection can be conferred on the bovine animal by vaccination with the attenuated strain of bovine bacillus known as B.C.G. (*Bacilli Calmette-Guerin*). This method of obtaining tubercle-free herds has, however, not yet been put to scientific proof under farm conditions in this country, and because it is essential that this should first be done, a long time must elapse

XUM

before a decision can be reached on its efficacy and practicability in the field. On the practical side there are points in immunisation which have not perhaps been generally appreciated by the farming community. Immunity to tuberculosis produced by vaccine takes time to develop, necessitating immediate removal of calves from their dams and strict isolation before vaccination and for a period subsequently. Also the immunity only lasts for from six to twelve months, and must be renewed periodically by re-vaccination. While, therefore, vaccination may afford a means of raising healthy stock from heavily-infected herds, the attention, skill and expense needful for its success cannot be less than in the scheme of eradication based on the tuberculin test. Furthermore, it must be remembered that animals which have been vaccinated with tubercle bacilli, either living or dead, react to the test for a variable, sometimes long, period subsequently. Such animals would therefore have to be excluded from a scheme of eradication based on the test, and could not be permitted to enter tuberculosis-free herds, as it would be impossible to decide whether a reaction was due to the vaccine or to a natural infection following on the decline of immunity."

This admittedly hopeful method is not even considered worthy of a trial in the most heavily infected herds, although even in this country a small number of whole-time veterinary inspectors with modest financial and laboratory assistance should be able to assess the practical value of the method in a few years' time.

There is to be only one method of attack on tuberculosis—eradication. Three hundred whole-time veterinarians were proposed for the offensive. The report is very vague, no doubt justifiably so, on the extent to which the campaign of eradication might develop, but if it were on a very small scale the 300 whole-time officers are in the meantime to be usefully employed on routine clinical inspection, because thereby the farmers would be educated to the desirability of participating in the eradication offensive. Apparently this plan was a little too nebulous for one member of the Committee who, in an addendum to the Report, envisaged 100 additional shock veterinarians to start the campaign, and optimistically calculated that after a twenty-five-years' battle, these veterinarians, now veterans, would have cleaned up and presumably handed over half a million clean cattle to their colleagues to keep clean. According to figures submitted in this addendum it may be calculated that when one-seventh of the cattle in the country are free from tuberculosis, the yearly cost of the scheme will be more than half the total sum which it is calculated might be saved yearly from all sources were tuberculosis eliminated from the three and a-half million cattle in the country.

With a bonus of 1*d*. per gallon on milk from tubercle-free animals, the sum now adopted by the Ministry's Attested Herd Scheme, half a million cattle, each averaging 600 gallons a year, would cost £1,250,000 per annum, and to this sum £400,000 would have to be added, being the cost of a service of 400 whole-time veterinary officers; bringing the total sum to £1,625,000, only £1,375,000 short of the total amount at present lost through tuberculosis.

The Attested Herd Scheme, the direct outcome of the Report, offers the farmers fewer financial benefits than those recommended by the Committee, although the principal bait, 1*d*. extra per gallon on milk from tubercle-free herds, remains the same. It has already been pointed out that the regulations governing the introduction of animals into attested herds are more rigorous than those recommended in the Report during the initiation of an eradication plan. Therefore the Attested Herd Scheme is even less likely to effect the dislodgment of tuberculosis infection from flying herds than were the recommendations of the Committee. The most that can be hoped for the scheme now introduced for operation is that it may encourage a number of self-contained herds to attempt eradication. The Milk Marketing Board's Accredited Producers' Roll will probably accelerate the present tendency of counties to appoint whole-time veterinary officers to carry out routine clinical inspection, as was recommended by the Committee. This plan has been welcomed by the agricultural Press as a great step forward for the dairy industry, and in the future there is grave danger that routine veterinary inspection of dairy herds will be used as a smoke screen to mask the necesity seen by the Committee for obtaining a milk supply free from tubercle infection either by eradication or by pasteurisation.

THE VETERINARY OFFICER IN THE TROPICS.

By G. W. STURGESS, I.S.O., V.D., M.R.C.V.S.

Late Chief Veterinary Officer, Ceylon.

MANY of the young veterinary officers appointed for service abroad will in the first instance be associated with senior officers, and so receive valuable guidance as to their work ; others may go to a post where they will take up duties without such help and be expected to initiate the line of work entirely alone. Therefore, in addition to professional qualification, a young officer must have the ability to sense what is practicable and what is not, however desirable a particular line of action may be. All matters will be subjected to discussion by various authorities, and the representatives of various interests, financial and otherwise.

His appointment may be due to the prevalence of epizootic diseases, as rinderpest, foot-and-mouth disease, or the various diseases due to protozoal infection, and the great loss and disorganisation caused by them. The district may comprise an area of thousands of miles of unfenced country deficient as regards communications and even facilities for obtaining ordinary living necessities. The whole transport work in the area may be carried on by cattle or buffaloes, so that cessation of movement is out of the question. Such a problem will require considerable thought and initiative by the veterinary officer.

It will be necessary to select and perfectly train a subordinate staff, establish detention and inspection posts along the route of transport, arrange for movement passes, establish inoculation camps, isolation camps, and in the case of diseases carried by ticks, dipping stations will be required.

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Slaughter of diseased animals may be a very thorny subject on religious grounds, and it may be best not to press this action, which might provoke considerable disturbances. The interest and co-operation of stockowners must be gained. They are quick to note good results, also very clever in devising means to defeat any efforts disliked. Very little good is done by vexatious prosecution, and any rumours against the ability or sympathy of the staff is disastrous.

Inexpensive camps may be constructed with bamboo, ropes of bark or coconut string, and coconut leaves or coarse grass, or rice straw, as thatch. For a sick animal camp the writer found a separate shelter for each animal very useful. These were constructed in the following manner: Frames of split bamboo resembling hurdles eight or ten feet square were thatched with coconut leaves. When required, two were set up leaning together and fastened by pegs, forming a sort of wigwam. A stout peg was driven into the ground in the centre, and the animal tied to it. The shelters were arranged in rows a prescribed distance apart. A convenient hut was constructed for a special attendant, who was provided with disinfectant fluid and instructed as regards personal disinfection. When an animal died, a hole was dug on the spot for burial, and the wigwam, with all manure and discharges, burned over it.

In connection with office and outside work, careful and detailed accounts must be kept. Usually the veterinary officer is required to keep a diary and to submit it to Government monthly for perusal and return. It is then filed in the office. Detailed instructions on these matters will be supplied to the office by General Orders and Financial Orders, which must be very strictly observed. Other matters for the veterinary officer's attention will be improvement of livestock, breeding, importation of animals from other countries, and quarantine.

The milk and meat supply is usually produced under very primitive conditions, and demand is mainly connected with towns. Much of the meat supply is obtained by slaughter of old working animals considered unfit for further work or use in agricultural operations. Mutton is mainly goat flesh. Often owners will refuse to sell animals if they are intended for slaughter. They prefer to allow them to swell the excessive number on the land and remain until they die from old age or starvation, or suffer a violent death from carnivorous animals. Such useless wandering animals become a serious problem when epizootic disease is prevalent. However, in the main towns a number of animals for slaughter are brought by travelling dealers and exposed for veterinary inspection. Those not too emaciated are passed for sale at a central slaughter-house. Butchers purchase their requirements and the animals are passed into the slaughter-house premises for a period of fasting and observation as regards freedom from rinderpest and foot-and-mouth disease. Slaughter takes place in the early morning and in the afternoon, the former for the breakfast and lunch supply, and the latter for dinner requirements in the evening. Owing to the heat, meat will not keep beyond half a day, and

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provision for cold storage is absent. The veterinary officer will supervise this work with the assistance of the slaughter-house superintendent.

As regards post-mortem inspection of carcases, emaciation will always attract notice. Tuberculosis affecting purely local cattle and buffaloes is seldom seen. Carcases showing lesions are almost invariably imported European or cross-bred cattle. Generally a large number of flukes (*Amphistome* sp.) will be found on the mucous membrane of the stomach and in the bile ducts. Buffaloes from certain districts may have an incredible number of these parasites in the bile ducts, so that the liver is entirely unfit for consumption and will be put apart for destruction.

The muscular tissue of a number of buffaloes will show gross infestation by sarcocysts. Such grossly infested carcases will be detained for destruction. Examination for " measle " will be a routine practice in the case of both bovines and swine.

Flesh and organs for destruction should be sprayed with tar disinfectant or liquid fuel, or a good part of it may disappear in transit to the destructor. Low-caste coolies have no hesitation about eating such flesh, and unless care is exercised may dig up and consume carcases of animals that have died from infective diseases. The question of the milk supply may be regarded as of greater importance than that of meat. Again, it is largely connected with town supply. In remote districts it is remarkable that many of the village people have little use for milk, and when there is a taste for it buffalo milk is preferred to cow milk. It sometimes happens that one may be amongst hundreds of cattle and no milk obtainable. In planting districts cows will be kept by planters for family supply. Usually there is very little pasture available, and even that may be badly tick-infested, so that the cattle are mainly confined to sheds, and stall-feeding practised. However, it is the importation of good dairy stock by planters over a long period that has resulted in quite a large number of very good dairy cows being found in those districts.

The milk yield of the pure local breed of cows is barely sufficient for the calf. The transport bulls or bullocks are much better specimens and receive more food and attention. Regarding improvements, it will be necessary to suggest reduction of number kept by disposal of inferior animals, selection for breeding and better feeding. It may be desirable to improve dairy cattle, transport cattle or buffaloes for agricultural operations. In furtherance of these objects, it may be necessary to establish dairies and farms where operations may be properly supervised. The definite object to be attained must be decided at the outset, and be kept in view for several years. Consideration must be given as to what may be the demand for, and the use of, improved animals if success is attained. Probable cost must be investigated.

Apart from the value and profit attending such projects to the establishments in charge of Government authorities, such may be quite useless to the general run of stockowners, who are not able to provide the necessary food and attention required by improved stock. The pasture alone may be quite useless for the

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maintenance of such animals, while the local unimproved stock do quite well if not too much overcrowded. Crossing may do more harm than good under such conditions. The quality of the soil and pasture is reflected in the stock and *vice versa*. Unless conditions for feeding can be improved by fodder-crop production, crossing with the object of producing larger animals is practically doomed to failure. As referred to earlier, reduction in number, fencing, selection and improvement of feeding afford better prospects of utility.

If importation of stud animals from another country is decided upon several important points must be considered, namely, acclimatisation and the influences to which animals from a different climate will be exposed, which are, the effects of powerful sunlight, temperature and humidity modified by elevation above sea level. Most concentrates used for feeding in European countries will have to be imported. Investigation as regards what food crops may be grown on the spot is necessary. Elevation exerts a profound influence. Animals may suffer great discomfort and eventually die in hot coastal districts, but be kept quite successfully at elevations of four or six thousand feet above sea level.

At sea level imported animals must be sheltered from the sun during the heat of the day in shady, cool sheds open on all sides to the air. At high elevations enclosed sheds are required, especially at night, when the temperature may fall almost to freezing point. Protection from exposure to infection by diseases, as piroplasmosis, trypanosomiasis, foot-and-mouth disease, or rinderpest, must be efficient since imported animals may soon be lost. Measures concerning protective inoculation, isolation, clearing of scrub, prevention of tick or fly infestation by spraying, dipping and fly-proof sheds must receive careful attention.

Mineral matters in the soil must be considered. Animals may thrive in one district, while in another they gradually emaciate and eventually die. Deficiencies may be in respect of calcium, phosphorus and iron—mainly calcium and phosphorus. Mineral constituents may be present but unbalanced, for example, in the case of heavy cereal feeding, phosphorus may be greatly in excess, and to give phosphates would aggravate the trouble. Calcium and phosphorus should be in almost equal proportion, with calcium a little in excess of the phosphorus. Careful attention in this respect will favourably influence fertility, nutrition and growth, with increased resistance to disease. An allowance of common salt is required daily.

On importation of sires for crossing, it will be advantageous if a number of selected local females are available for service as quickly as possible. For dairy purposes the imported animals will be of a reputed milking strain. The first cross females may be expected to show a great improvement on the pure local breed. Great attention must be paid to the rearing of such calves. The males may prove of little value for draught purposes. It may be found necessary to maintain two herds where the Zebu variety will be crossed by imported sires in order to furnish pure Zebu females for crossing to produce first-cross heifers. The pure Zebu males will be readily saleable as transport animals. Breeding

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between cross-breds will not be encouraged. The sire must be pure bred on one side or the other. It is advantageous to use occasionally a pure Zebu bull to keep a good proportion of Zebu blood, conferring a greater resistance to climatic conditions.

The skin of many tropical varieties of cattle is less attractive to ticks than the tender skin of the imported European animal on account off differences in thickness, texture and odour. In this connection, Zebu bulls have been used on ranches in South America with advantage in reducing tick worry. Anyone who has not experienced gross tick infestation has no conception of the magnitude it may attain. The victim may be covered by a layer of ticks almost as numerous as the hair, and be worried and bled to death. Blood from such an animal resembles coloured serum. When travelling in a badly infested area, larval ticks attach themselves plentifully over one's person, and may cause a crop of troublesome indolent sores on the legs or a very serious illness. It is necessary to use two pairs of good putties so that those used during the day may be boiled each evening; usually they will be full of larval ticks. Good boots are necessary, as shoes are useless for protection.

In rice-growing areas the buffalo is of the greatest importance. Loss of buffaloes due to a wave of rinderpest may cause agricultural operations to be very seriously hindered and even famine threatened. Attention to their welfare is therefore of the greatest value to the country population, who attach considerable value to them. Since they require much water for health, and spend much time in grazing and wallowing in lakes and marshes, many are grossly infested by flukes. On post-mortem examination the bile ducts may be found enormously dilated and packed with flukes. Others may be grossly infested by sarcocysts in the muscular tissue. Both these conditions account for much of the poor condition of the buffaloes in certain districts. In places within a few degrees of the equator buffaloes are small and the cows poor milkers, while in parts of North India they are magnificent animals, and the cows very good milkers, yielding three of four gallons of rich milk daily. Unfortunately, in town dairies, for which these animals are imported, there is great neglect of the calves, and a large proportion die of starvation. The calves are taken alongside the mother at milking time, or milk is withheld. If the calf dies it is skinned, and the skin used in place of the calf, or it is stuffed with straw, and four sticks attached as legs. Either is used to represent the calf.

Measures for improvement will be better feeding, proper feeding and rearing of the calves, which should be kept free from the worm infestation commonly met with. Stud animals should be obtained from districts where suitable ones may be found. In some districts many buffaloes will be blind in one or both eyes, due to nematodes (*Thelazia* sp.) in the conjunctival sac. It may be difficult to see these nematodes, and close examination is necessary. They wriggle about over the cornea, causing irritation, opacity and blindness. Flushing the eye with dilute mercury, zinc or lead lotion is generally sufficient to dislodge the parasites.

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If sufficient call for the provision of stud buffaloes over a district it is advisable to select a suitable tract of land and establish a breeding herd for the purpose and maintained under departmental supervision. In the tropics it is imperative for the veterinary officer to be always on his guard with reference to canine rabies. It is often prevalent, and many persons are bitten by dogs, when the question of diagnosis becomes most urgent. Commonly mistakes are made, and a dog developing rabies is thought by the owner to have a bone in the throat. During attempts to relieve the supposed condition several members of a family may be bitten or scratched. The public should be warned by simple leaflets describing the symptoms of rabies and the nature of action desirable when dogs appear unwell. Often suspected dogs are destroyed on the spot. Owing to distance it may not be possible to send material for diagnosis before putrefaction has occurred. Clear instructions as to the method of forwarding small pieces of brain for laboratory examination should be circulated to all local authorities and medical officers with the request that the necessary container and preservative solutions are always in stock. If possible, a suspected dog that has bitten anyone should be securely tied up or confined in a kennel pending inspection by the veterinary officer. If the dog is alive and well for ten days, persons bitten have little to worry about. If it becomes ill and dies within ten days, persons bitten should obtain preventive treatment immediately at the nearest institute. The director of the institute will decide whether a modified or full course of treatment should commence pending the result of laboratory investigation.

Often the veterinary officer is confronted by very painful incidents. While giving every possible help and sympathy, he should not take the responsibility of advising anyone not to take treatment, but refer them without delay to the medical authorities for advice, and co-operate with them in doing everything possible for the patient. Owners may be unwilling to keep a suspected dog on the premises. The provision of a two-chambered iron-barred kennel at every police station for detention and observation of a suspected dog is of great service. The chambers are separated by sliding bars so that each may be cleaned in turn, and food and water provided without risk. Owing to large numbers of pariah dogs muzzling is impracticable. Regulations for dogs to be kept on a collar and chain, seizure of dogs not so kept and their humane destruction, arrangements for anti-rabies vaccination, will have to be initiated by the veterinary officers.

In conclusion, it is most desirable for the veterinary officer in the tropics to be well conversant with methods of microscopical examination of blood, tissues, milk, urine, fæces, for parasites and ova. Many have to rely upon their own examination, since no laboratory assistance may be available. A knowledge of the methods of insect breeding—intermediate hosts, and the methods for testing disease-transmitting powers, is also of great value.

In this connection, in the writer's experience, it is really extraordinary how few officers, both veterinary and medical, make first-class blood smears, or forward material for examination well preserved.

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It is most desirable that travelling officers and inspectors should carry a small supply of absolutely clean glass slides and small specimen tubes: one containing preservative solution, one potassium citrate for blood, and two or three sterile swabs, all contained in a small airtight and waterproof box, available for immediate use. It is very difficult to make up such necessities when in the jungle, and opportunity for diagnosis may turn up most unexpectedly and not be easy to obtain again. Such a package can be despatched by quickest route to the central office and laboratory for further investigation, and a clean package be returned.

An an example of what may happen, one experience may be mentioned. Disease amongst transport cattle was reported from a planting district, and rinderpest was suspected. In fact the local authorities had put rinderpest regulations into force. A satisfactory diagnosis had not been obtained, and a visit of inspection was necessary. After a day's work looking over local carting establishments with a negative result, the writer was standing outside the local rest house one evening watching the passing transport, when one of a pair of bullocks attached to a cart was observed to stagger and fall on the road a short distance away. Inspection was made at once, but no reason for the occurrence could be ascertained. Microscopical examination of the blood was made at once, which revealed *T. evansi* abundantly present, and the diagnosis was surra. Next day blood examination was negative.

AN R.S.P.C.A. LIVERPOOL ANIMAL CLINIC.

THE R.S.P.C.A., Liverpool Branch, recently decided to rebuild their premises in Larch Lea, Everton, Liverpool, where they had for many years carried on their Liverpool Animals' Hospital. This step was taken largely at the instance of the Merseyside Veterinary Committee, which was represented on the special committee of the Society set up to deal with the proposition. The new buildings were publicly opened as "The Liverpool Animal Clinic" on Wednesday, April 10th. The proceedings commenced with a public meeting in Richmond School Hall at 3 p.m. The gathering was presided over by the Lord Mayor of Liverpool, Alderman F. T. Richardson, J.P., who was supported by the Lady Mayoress. The spacious hall was filled to capacity; the Society was well represented, and the following veterinary surgeons were among those present on the platform or in the body of the hall: Professor Sir Frederick Hobday, C.M.G., F.R.C.V.S., F.R.S.E., Hon. Veterinary Surgeon to H.M. The King, Principal and Dean of the Royal Veterinary College; Lieut.-Col. P. J. Simpson, D.S.O., T.D., J.P., F.R.C.V.S., Member of Council R.S.P.C.A., London; supported by the following members of the veterinary profession: Messrs. Henry Sumner (senior and junior), A. W. N. Pillers (Chief Veterinary Officer Liverpool Corporation), H. T. Matthews (Deputy Veterinary Officer, Liverpool Corporation), R. P. Holmes (Chief Veterinary Officer, Corporation of Bolton), Gladstone Mayall (Assistant

Editor, THE VETERINARY JOURNAL), R. S. White (Hon. Sec., Merseyside Veterinary Committee), J. H. White, T. G. Sommerville, H. G. Rogers, P. T. Lindsay.

Letters of commendation were to hand from Mr. G. H. Locke, as President of the Royal College of Veterinary Surgeons, and from Mr. R. C. Locke, as President of the Lancashire Veterinary Association.

The Lady Mayoress graciously received a bouquet at the hand of Miss Barbara MacWilliam, who also presented button-holes to the Lord Mayor and Sir Frederick Hobday.

The Secretary gave a brief retrospect of the work. It had been founded in 1917 in a neighbouring part of the city, the premises being formally opened by the first Viscount Leverhulme. For years past the attendances had totalled about 2,300 per annum, but during 1934, thanks to certain improvements, the actual number of new cases totalled 2,375, and the attendances 5,810, while during this present year the attendances were at the rate of about 6,500 per annum. Two rules were strictly observed: only those animals were treated whose owners could not afford to pay fees, and the treatment was carried out by qualified practitioners who served in an honorary capacity. The primary aim of the Society was to alleviate or prevent or terminate the sufferings of the poor man's animal, the errand boy's puppy, the old dame's cat, and the backyard hen; they were conscious that in so doing something more was accomplished: namely, the cultivation of humaneness, the raising of the status of the animal, and the exercising of a beneficent influence on the character of the entire community. So long as this dual result was attained, then the Society, and all who were associated with them in this movement, were well content. The Hon. Treasurer, C. W. Hesketh, Esq., F.C.A., gave a brief financial statement, showing that the total cost of the premises with the equipment was £2,000, towards which the following sums had been received:

Tail Waggers' Club, Ltd.	£250
Liverpool Council of Social Service Charities Fund ...	£50
Mrs. Ravenscroft	£101
Other Gifts	£60
Making a total of	£461

A gift of £20 would endow a kennel. Donations were invited, and an invitation was given to all to visit the clinic at any time.

The Lord Mayor spoke in most cordial terms, expressing his pleasure that the Society had thus been able to expand, and offering good wishes for further expansion in the future. The Lord Mayor then invited the principal speaker, Sir Frederick Hobday, to address the meeting.

Sir Frederick said :

" My Lord Mayor, Lady Mayoress, Ladies and Gentlemen,

" The work which we are assembled here to support to-day has the approval of every English man and woman, for the love of the English people for animals is proverbial in every part of the world ; and it could not be demonstrated in any more sympathetic and noble way than that of assisting our dumb friends when " down and out " from accident and sickness. I deem it a very great privilege to have been asked to perform this ceremony, and I am especially proud to see that the efforts of the Liverpool Society are supported by such a goodly number of my own profession. This is as it should be, for there is no body of men who practice " practical " humanity to a greater extent than does the every-day practitioner of veterinary science.

" The Royal Veterinary College in London was the first body of its kind to initiate a regular service of free treatment for the animals of the poor some 154 years ago, and in this clinic last year some 12,000 patients were treated, every one having its ailment or injury diagnosed by a qualified M.R.C.V.S. ; the treatment being administered either by himself or by a senior student under his supervision.

" London is a big city, and we have many so-called animal clinics, some of which, unfortunately for the animal, *allow the sick and helpless patients to be prescribed for and even operated upon by men without any proper qualifications or training in anæsthetics. This, we animal lovers say, is morally wrong, for we assert emphatically that the animal of a poor man when ill has just as much moral right to proper diagnosis and treatment of its ailment as has the animal of the rich ; and to have it experimented upon (for that is what it amounts to) by any Tom, Dick or Harry, even if he has previously been a groom or kennelman, is wrong, and should be stopped by the laws of the land.*

" When I tell you that in order to obtain even sufficient groundwork in veterinary science to be admitted to the course for the diploma of the R.C.V.S. it is necessary to matriculate at the same standard as for the course in human medicine, the law, divinity, or any of the learned professions, and after that to spend a minimum of five years' study before being allowed to sit for the diploma of M.R.C.V.S., and a further year if the University degree is desired, you will readily understand that the quack cannot possibly know much in comparison.

" The Council of the Society for the Prevention of Cruelty to Animals has, in its kindly wisdom, seen this point, and has decided definitely to act upon it, in that they have given their word to the Council of the Royal College of Veterinary Surgeons that at all their clinics a qualified veterinary surgeon shall always do the veterinary work, especially the operative surgery ; and they are forming animal clinics all over England on these lines. In London there are nine of these clinics, all having qualified surgeons in charge, which give advice and prescribe treatment for the animals of poor people who cannot afford to pay; but the oldest of all in Great Britain is the Royal Veterinary College Poor Out-

patients' Clinic, where for some time an average of 10,000 to 12,000 patients annually have passed through our hands, all of which have their ailments diagnosed and treatment carried out by qualified surgeons. It is largely owing to the fact that I know from first-hand experience the great amount of animal suffering which can be relieved by an animal clinic when a veterinary surgeon is in attendance that I have thrown myself heart and soul into the effort to help you and my colleagues in the good work you are extending in Liverpool to-day. Altogether during the year 1934, more than 110,000 sick or injured animals have been treated under the Poor People's Scheme, and it has conferred innumerable blessings both to sick animals and owners alike. Each place, too, is supplied with the means for humane destruction, so that when the sufferer becomes hopelessly incurable it can be painlessly "put to sleep." In questions of humanity to animals it is meet and right that a large city like Liverpool should be well in the foreground, and I read in your report what your Secretary has also told you to-day, that the Liverpool branch of the R.S.P.C.A. was founded as long ago as 1841. This particular Clinic, the extended premises of which I have the honour to be asked to open to-day, was not established as a stationary clinic until 1917, although a decentralised system for the animals of those unable to pay veterinary fees has been in working order since 1909.

"Between 1917 and 1920 the headquarters of the Clinic were at Sheil Road, and it was not until 1920 that the Clinic was moved into its present quarters, where we are to-day supplying a much-felt want to the poor animal owners of Everton township district with its 110,000 people of all grades of life. The adjoining Abercromby district, with 42,000 people, is even more fortunate in that it too possesses a fully equipped Poor Out-Patients' Clinic, which has the great advantage of being attached to the Veterinary Faculty of Liverpool University, where every kind of help can be co-opted from their well-equipped departments. Here, as in the case of the R.S.P.C.A. Clinic, the veterinary diagnosis and treatment is in properly qualified hands; and both patient and owner alike appreciate the difference this makes for the prospects of restoring to health and usefulness a much-loved animal pet or valuable worker.

"Reading again from the Liverpool Report for 1934, I see that in this animal clinic 2,375 new cases were brought up for diagnosis, and that this involved some 5,810 re-inspections. The premises now comprise a waiting room, a surgery, a drug store, an operating theatre, a food kitchen, kennels and cattery; and the total cost, including equipment, amounts to £2,000. An attendant is in charge day and night; whilst the veterinary surgeons who give up their time voluntarily to this good work are amongst the busiest and most respected practitioners in the whole profession. For this the animals belonging to poor people in Liverpool are extremely fortunate.

"With these few remarks my Lord Mayor, Lady Mayoress, Ladies and Gentlemen, I shall presently declare the premises of the new Clinic of the Liverpool Branch of the R.S.P.C.A. to be open, but before doing so I should like to express to you

my impression of the new Clinic which I have just had the privilege to see. This is best expressed by the well-known phrase which is traditional and so well known in Lancashire, and so frequently ' rubbed in ' to those who are unlucky enough to live in the other counties of Great Britain, *viz.*, ' that what Lancashire does to-day, England does to-morrow.'

" Mr. Winchester and the Committee are to be congratulated on the way in which so much has been done on so small an expenditure, and I wish the Clinic every success in the merciful work upon which it has embarked."

Lieut.-Colonel P. J. Simpson then spoke. He explained that as a member of the Council of the R.S.P.C.A. in London, he had occupied a seat on the special Committee appointed to draw up the booklet recently published on the proper conduct of animal clinics, and he assured the Liverpool branch of the Society that in their new clinic they had carried out all the points which had been agreed upon by the veterinary profession and the Society in this important matter. It was essential to have a working agreement of this sort, and he was pleased to see that things were going so well.

Mr. Ronald S. White, M.R.C.V.S., spoke as a member of the special sub-committee which had promoted the Liverpool Clinic. He said that the Society had given then very nearly everything they had asked for, and he and those for whom he spoke were very happy to carry on the work.

A vote of thanks was then proposed by Dr. Hayward, Vice-Chairman of the Society, who paid a special tribute to the contribution made by Mr. H. Sumner, Junr., and Mr. Ronald White, in consulting and advising as to the planning and equipment of the new Clinic. The vote was seconded by Major M. P. Rathbone, member of committee, and carried with acclamation. On the special invitation of the Lord Mayor, Mr. Henry Sumner, the *doyen* of the profession in Liverpool and Merseyside, who was received with the heartiest applause, spoke, assuring the meeting of the great pleasure he found in seeing the scheme progress so far, and his deep sense that the work benefited not only the animal and its owner, but also the spiritual interest of the community.

The Lord Mayor then led the company to the Clinic a few yards away. On arrival, the Architect, Mr. J. E. Bladon, handed a specially prepared silver-gilt and suitably engraved key to the Lord Mayor, who, as President of the Society, in this way received the completed building on the Society's behalf. His Lordship then handed the key to Sir Frederick Hobday, asking him to open the building and to retain the key as a memento.

Sir Frederick then turned the key in the lock and opened the door, whereupon the Lady Mayoress entered the premises with a wire-haired fox terrier dog, symbolising the commencement of the work in the new premises. The whóle company then made a tour of inspection, later returning to the school hall, where tea was served.

Abstracts of Current Literature

Intoxications of Vegetable Origin. By A. Henry. (*Continued from page* 144).

Graminaceæ with Intoxicating Seeds.

The caryopses of several Graminæ are capable of causing, particularly in the pig, nervous phenomena simulating intoxication : they are seeds of *Lolium Temulentum, L. linicola, Bromus secalinus,* and sometimes rye itself. These accidents appear more and more rare ; they are probably due to a principle (piridic base) which is formed by the action of a parasitic fungus of the species *endoconidium.*

Colchicum.

Colchicum (*Colchicum autumnale*) is one of our principal toxic plants ; but as the poisonings it produces are well known to you, I will only mention the elements of the subject. Particularly abundant in certain pastures with a humid subsoil, colchicum may be found in the spring as leaves which embrace the capsules of the preceding year, coming to repose on the surface, and to form flowers in the autumn.

In the fresh state animals generally leave the plant alone ; but one sometimes finds a few cattle in which the consumption of four to five kilograms of the green plant causes death. It is chiefly the leaves and the dried fruits with the hay which cause accidents. The bulbs can be rooted out by pigs, and cause death in doses of about 0.30 gr. per kilogram. The active principle is an alkaloid *colchicine,* used also in therapeutics, and of which you know the properties. Intoxication in herbivora often shows an example of slightly delayed symptoms. In fact there exists a period of incubation of at least two hours : it is this which causes the seriousness of the accidents ; these occur too late for us to act effectively. The principal symptoms are abundant salivation, dysphagia, vomiting, colic, diarrhœa, hæmaturia, and plain hypothermy. Death takes place by the lungs and not by the heart : thus artificial respiration is indicated ; but the digestive disorders, notably those of the large intestine, are such that by themselves they can cause death.

The Veratræ, notably *Veratrum album,* wrongly named white hellebore, is found with colchicum in hilly and mountain pasture ; they are very dangerous plants. The most important active principle is *jervine,* a volatile alkaloid which only prevents the hay containing Veratræ from remaining very toxic because the alkaloid fixes itself in the other plants.

Maritime Scilla.

Certain sandy pastures of the Mediterranean region of Algiers are infested with squill. Squill is an acrid narcotic poison, emetocathartic, capable of causing accidents in relatively minimal doses : 100 grammes for a horse, 250 grammes

for the ox, and 25 grammes for a sheep or pig. Fortunately the plant is most toxic in the dry state. Rodents are specially sensible to this plant, and it forms on this account the ingredient of many rat poisons.

Bulbs of Liliaceæ and Amaryllidaceæ.

Chiefly cultivated in gardens. Pigs, fond of all plump roots, are most likely to be poisoned. Toxic principles of bulbous roots are tulipine in tulips, amarylline and bellamarine from the *Amaryllis*, also used by the Hottentots as arrow poison; the *Fritillaria*, the *Narcissi*, the simple snow-drop, are also dangerous bulbs. All the bulbs of Liliaceæ and Amaryllidaceæ are emeto-cathartic in the fresh state. In South Africa and in several hot countries many of these plants grow in large quantity in the wild state and constitute a permanent danger to animals.

Plants containing Oxalic Acid or Oxalates.

These plants occur chiefly in the family Polygonaceæ and Oxalidæ. *Rumex acetosella*, sheep dock, causes trouble in horses and sheep. *Polygonum cuspidatum*, an ornamental plant of rapid vegetation, and sometimes invading forage. Rhubarb of the garden, of which the veins of the leaf poison goats; finally, *Oxyalis acetosella* of forest pasture.

Phototoxic Plants.

Accidents produced by Sarrasin, well known under the name of *fagopyrism*, only represent a peculiar case of a very general phenomenon of sensibility to light, or, to speak more exactly, to certain rays of the spectrum akin to violet rays, by fluorescent substances of notably red pigments. Sarrasin causes phototoxic accidents because it develops in its stem and flowering summits a red pigment which may also be found in several species of *Polygonum*. Other plants, the Mille pertuis, for example, may also produce certain red sensibilising pigments. Accidents therefore result from a preparation of the subjects by certain inert substances by themselves, and completely harmless for animals living in the stable, the shed or the sheep fold; the troubles arise by the action of luminous active rays on the regions of the skin not covered by long hair, and as a condition also that this skin is not pigmented. For all these reasons the accidents are localised; in the horse, at first on the nose, where there is some scale; in the cow, on the udder and white parts of the skin (this is most clear on white, spotted animals); in sheep, almost only on the face.

Accidents occurring in these places are of variable gravity: simple erythema, dermatitis, with subcutaneous œdema; sphacelus of cutaneous shreds; in grave cases general phenomena accompany cutaneous accidents. There are intestinal disturbances: colic and diarrhœa, nervous excitement at first followed by brain trouble; cases of death may occur.

I ought to add that all vegetable photo-sensibilising substances have not yet been well investigated. Multiple observations tend to show that ingestion of clovers of different kinds (*T. pratense, T. hybridum, T. elegans*) may determine *trifoliasis*, causing inflammation of white regions of the head, limbs, also of the

buccal mucosa with or without digestive and nervous disturbances. Lucerne and the vetches have been accused of producing small epizootics, declaring themselves by a tumefaction followed by gangrene of white regions of the skin. All these phenomena are phototoxic accidents. Extract of male fern is equally capable of sensibilising sheep with respect to light ; recently it has been recognised that the sensibilising substance can pass by the milk of the ewe to the lamb and sensibilise the latter.

(To be continued.)

Personal

By the death of Mr. Marsh Tailby, M.R.C.V.S., of Birmingham, at the age of ninety-five, the profession loses one of its most respected members. A Midland man, Mr. Tailby practised in Birmingham for over sixty years, his practice being a very wide and successful one ; and his opinion was much sought after in a consultative capacity by his brother members, especially on questions connected with the horse and lameness or shoeing. Mr. Tailby's father was a member of the Birmingham Town Council, and his son, who predeceased him, graduated as a veterinary surgeon and joined his father in the practise of his profession.

The racing and thoroughbred stock world will read with regret of the death of Mr. Frank Barling, M.R.C.V.S., the well-known trainer of race horses. The son of a veterinary surgeon, and with numerous relatives in the profession, Mr. Barling inherited the veterinary instinct which stood him in such good stead both for winning on the race course and also in the show ring. In the latter Frank Barling was a familiar figure, for it was his pride to take the horses in the ring personally, and to this may be attributed no small measure of his success. His best season as a trainer was in 1919, when he won the Derby with Grand Parade for Lord Glanely, and finished second in the winning trainers' list, with stakes to the value of over £30,000 ; and at Ascot in the same year he had no less than six winners : Dominion (Prince of Wales' Stakes), He (walk-over, Churchill Stakes), Grand Parade (St. James' Palace Stakes), Bright Folly (Windsor Castle Stakes), Scatwell (Wokingham Stakes), and Sky-Rocket (dead-heat for Visitors' Handicap).

THE INTERNAL THERAPEUTIC VALUE OF KAOLIN AND KAOSORB

Kaolin is a native aluminium sulphate and occurs as a fine white powder. It is derived from the decomposition of the felspar of granite rocks, and contains 47 per cent. silica, 40 per cent. alumina, and 13 per cent. water. It is completely insoluble in water and mineral acids. In the alimentary canal it acts as a mechanical protective of the mucosa, and is anti-emetic and astringent. In this respect it resembles bismuth carbonate. In addition it absorbs toxins, this property being dependent upon the fineness of its state of division. Its use is indicated in acute and chronic inflammatory conditions of the alimentary canal, particularly the small intestine and the colon. For the latter it may, with advantage, be combined with liquid paraffin. It is non-toxic and should be given frequently in comparatively large dosage ; for the dog, 30–120 grains.

Kaosorb is a highly refined colloidal Kaolin specially prepared by Kaylene, Ltd., for internal medication either in this form or as Kaosorb-ol, for which is claimed a very definite therapeutic value as a non-irritant agent which materially counteracts septic absorption in cases where this has its origin from toxins produced in the intestinal tract.

XUM